





27, 962/B

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# Register of the Small-pox in Chester, 1778.

i.			ii.	iii.	iv.	v.	vi.	vii.	viii.	ix.	x.	xi.
PATIENTS.			Street.	Occupation.	Small-pox fever began.	Date of information.	Gratis Rules, or Promissory Notes.	Whence infected.	Date of Death or Last Scab.	Washed and aired.	Infection communicated to	Rules observed or transgressed.
Order.	Name.	No										
1.	E. Bryly's	2	Sty-lane.	Fisherman.	1778 Janu.	Jan. 30.	P. N. Jan. 30.				none.	observed.
2.	M. Morris's	2	Bridge-ft.	Flour-dealer	March 24.	April 3.	P. N. April 3		April 25.	April 26.	Coleclough's 4th Fam.	transgressed.
3.	A. Collier's	2	Northg-ft	Bricklayer.	April 7.	April 14.	P. N. Ap. 14.		L. S. Ap. 29.	April 30.	none.	observed.
4.	H. Coleclough's	2	Bridge-ft	Labourer.	1st Ap. 23. 2d May 3.	April 26.	P. N. Ap. 26.	Morris's 2d F.			none.	observed.
5.	Mr. Smith's	1	Bridge-ft.	Watchmak.	April 22.	April 24.	G. R. Ap. 24.		L. S. May 4.	May 5.	none.	observed.
6.	A. Singleton's	2	Northg-ft	Labourer.	May 6.	May 10.	P. N. May 10.	Liverpool.			Ashton's 7th F.	transgressed.
7.	E. Ashton's	2	Northg-ft	Labourer.	1st May 30. 2d June 14.	June 4.	P. N. June 4.	Singleton's 6 F.	June 23.	June 24.	none.	observed.
8.	H. Price's	1	Gorse St.	Shoemaker.	May 29.	June 8.	P. N. June 8.		July 6.	July 8.	none.	observed.
9.	E. Evans's	2	Bars.	Cobler.	May 30.	June 13.	P. N. June 13.	Croughton.	June 27.	June 27.	10, 11, 12, 13 Families.	transgressed.
10.	A. Conolly's	1	Bars.	Baker.	June 18.	June 23.	P. N. June 23.	Evans's 9th F.	July 10.	July 10.	none.	observed.
11.	C. Jones's	1	Bars.	Weaver.	June 22.	June 25.	P. N. June 25.	Evans's 9th F.	July 14.	July 15.	none.	observed.
12.	H. Huxley's	2	Bars.	Newsman.	June 20.	June 25.	P. N. June 25.	Evans's 9th F.	July 14.	July 15.	Smith's 17th F.	transgressed.
13.	Mr. Jenkin's	1	Bars.	Tanner.	June 16.	June 26.	P. N. June 26.	Evans's 9th F.	July 14.	July 15.	Morris 15th F.	transgressed.
14.	E. Alsop's	1	Bars.	Soldier.	July 9.	July 11.	P. N. July 12.	10th, 11th, 12th or 13th Families.	July 29.	July 29.	Downing 16 F.	transgressed.
15.	M. Morris's	1	Foreft-ft.	Shoemaker.	July 20.	July 23.	P. N. July 23.	Jenkin's 13th F.	August 3.	August 4.	none.	observed.
16.	A. Downing's	1	Bars.	Sailor.	July 23.	July 27.	P. N. July 28.	Alsop 14th Fam.	August 2.	August 4	none.	observed.
17.	A. Smith's	2	Bunce-la.	Glazier.	July 22.	Aug. 6.	P. N. Aug. 6.	Huxley 12th F.	August 21.	Aug. 21.	none.	observed.
18.	E. Tilston's	1	Foreft-ft.	Shoemaker.	Sept. 10.	Sept. 26.	P. N. Sep. 26.		October 7.	Oct. 8.	none.	observed.
19.	E. Johnson's	1	Gorse St.	Labourer.	October 4.	Oct. 5.	P. N. Oct. 5.		October 14.	Oct. 15.	none.	observed.
20.	L. Bellis's	3	Crooks-l.	Coachman.	1. Oct. 21. 2. Nov. 2. 3. — 3.	Oct. 29.	P. N. Oct. 30.		November 27.	Nov. 21.	none.	observed.



*See*

A N  
I N Q U I R Y

How TO PREVENT THE

S M A L L - P O X .

A N D  
P R O C E E D I N G S

O F A  
S O C I E T Y

For promoting GENERAL INOCULATION at stated  
Periods, and preventing the NATURAL SMALL-  
Pox, in CHESTER.

—— culpam compeſce, priuſquam  
Dira per incautum ſerpant contagia vulgus.

VIRG. GEORG. iij. 468.

Correctio ſpecifica niti dabet illi [variolarum] veneno  
contagioſo. Qualis inveniri poſſe, comparatio hiſtoriz  
antidotorum, et indoles huius mali, faciunt ſperare;  
et ad indagandum impellit ſumma hinc futura hu-  
mano generi utilitas. BOERH. APH. 1390. 1391.

By JOHN HAYGARTH, M. B. F. R. S.

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M D C C L X X X I V .

*JW Collins*  
*The Mall*  
*Warrington*  
*Essex*  
*1840*

92604



TO THE  
MEMBERS  
OF THE  
SMALL-POX SOCIETY,  
In CHESTER.

FRIENDS AND FELLOW-CITIZENS,

**T**O you, the following pages are addressed, with sentiments of sincerest gratitude. To your humanity and munificence, the institution, which is founded on the principles of this INQUIRY, owes its existence. To you I appeal, as witnesses intimately acquainted with the facts, on which the

argument depends, that they are stated with accuracy and fidelity.

To the medical members, I gladly return my thanks, for their candid acquiescence in the proposal of a Small-pox society, and for their countenance and assistance in the execution. It is with peculiar pleasure, that, upon this occasion, I express the high satisfaction which I feel, on reflecting, that I have had the happiness to enjoy with you, a friendly intercourse of mutual good offices, for more than *seventeen* years, without the smallest interruption. While emulation has excited among us the most sedulous care of our patients, it has never, I believe, in a single instance, produced invidious detraction, or dissention, effects of those malignant passions, which too often are so injurious and so disgraceful to the profession. This circumstance claims particular notice on the present occasion :  
because,

because, the slightest breath of medical opposition, from whatever motive it might have proceeded, must inevitably have destroyed so unpopular an establishment. To you, I appeal, not only as witnesses of the facts, but as judges, whether the argument deduced from them be conclusive. You can all bear testimony that the experience of the society for six years has not excited a *medical* doubt, that the *Rules of Prevention* submitted to your consideration in the original proposal, have proved fully adequate to their purpose. A public establishment, for so long a period, has supplied more numerous and more authentic facts, than the private practice of any physician, during his whole life.

To the other members of the committee, I return my grateful acknowledgments, for their steady support, amidst all the prejudices and discouragements, which opposed this institution.



tion. To the high opinion which your fellow citizens so justly entertain of your good sense, and humanity, it is chiefly to be attributed, that the society was established. To your chairman, Thomas Falconer, Esq; with whose intimate friendship I have been long blest, I owe the greatest obligation, on this and many other occasions. Being not more distinguished by his great learning, and the excellence of his understanding, than by the benevolence of his heart, his assiduous zeal in this business, had the most beneficial influence.

I CANNOT but express, with a painful recollection, my regret for the loss of many deceased subscribers, who were very sincere and active friends to the charity; a loss which will be long lamented in this place, and was particularly unfortunate in the infancy of this institution.

It

It would be ungrateful not to return my peculiar thanks, as I do most sincerely, for some contributions, which I have reason to think were intended as a personal favour.

BEFORE this society commenced, half as many children under ten years old, died of the Small-pox, in Chester, as of all other diseases. It is, beyond all comparison, the most mortal Pestilence that has visited this island for more than a century past. Your proceedings have clearly proved, that it is medically possible to exterminate this Pestilence. You have seen, not only the medical principles, but the practical rules so firmly built, on the foundation of facts, that they can never be shaken by any temporary or local prejudice.

THERE is just reason to hope that the benefit of this institution may extend

tend farther than this place. And it will ever be remembered, that such benefit was derived from the humanity, the generosity, and the enlightened knowledge of the citizens of Chester. A view of such enlarged beneficence to mankind, will give the most cordial satisfaction to you, as well as to

Your sincerely affectionate,

And faithful humble Servant,

J. H.



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§ V:

§ V. *The period between infection and the commencement of the variolous fever, is generally from the 6th to the 14th day inclusive, after inoculation : and this period is not much longer in the natural Small-pox.*

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§ VI. *Persons, liable to the Small-pox, are infected by breathing the air, impregnated with variolous miasms : Either (I) very near a patient in the distemper, from about the time that the eruption has appeared, 'till the last scab is dropt off the body ; or (II) very near the variolous poison, in a recent state ; or (III) that has been close shut up, ever since it was recent.*

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§ VII. *Clothes, furniture, food, &c. exposed to the variolous miasms, never, or very rarely become infectious.*

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AN

INQUIRY

HOW TO PREVENT THE

SMALL-POX.

B





## INTRODUCTION.

**W**ITH great diffidence, I venture to advance objections against generally received opinions, on a subject that has lain open to every man's observation above a thousand years, and that has, for more than a century past, been frequently discussed by the most judicious and sagacious authors. But the small-pox is of such high concernment to mankind, that every effort, however inadequate, to check its fatal ravages, will be received; I trust, with peculiar indulgence.

THERE are two opinions, which have so generally prevailed as to repress every attempt, in this country, to prevent the small pox. 1. Clothes, &c. exposed to the variolous effluvia, are supposed,

#### 4 INTRODUCTION.

ed, I believe universally, to retain an infectious quality. And 2. When the distemper is epidemical, the whole atmosphere of the place is thought to be contaminated. To these points I particularly request the reader's attention.

It may be necessary to state, that, in this INQUIRY, I do not consider imaginary prejudices. 1. How long a time the clothes, &c. which have been exposed to the variolous effluvia are supposed to retain their infectious quality, may be differently estimated, this subject having never been, that I know of, particularly considered. A physician of the most respectable authority, when asked whether he thought that the doctrine, on this point, advanced in the INQUIRY, was true, positively asserted, that ' he had known a medical wig, ' exposed to the effluvia of a small-pox ' chamber in London, which, after ' travelling to Plymouth, had retained such

## INTRODUCTION. 5

such an infectious quality as to communicate the distemper to a person in that town.' If clothes, &c. can be supposed to retain the pestilential effluvia, for so long a time and so distant a journey, no person liable to the distemper can be secure from danger. It would be utterly impossible to guard against such unthought of mischief.

2. WHEN a manuscript copy of these papers, and the printed *Proposal* of a small-pox society in Chester, were circulated among my acquaintance, I was favoured with the following remark, by a most intelligent medical friend :  
' Strange it is that physical people  
' should have generally admitted, that  
' the common atmosphere was so affected,  
' ed, when the small-pox became epidemic,  
' as to be universally infectious !  
' And yet true it is. When I first dis-  
' coursed with — — — on the papers,  
' and told him how confined the efficacy



## 6 INTRODUCTION.

‘ cacy of the poison seemed to be, and  
‘ that, in the open air, I believed it  
‘ would, in ordinary, scarcely extend to  
‘ the boundary of a circle of a yard  
‘ radius : He treated the assertion as in  
‘ the highest degree absurd, and at  
‘ once ventured to affirm, that he had  
“ known it to extend *thirty miles* !”  
“ How loosely have these matters  
‘ been considered !” Now if the vari-  
olous poison could render the atmos-  
phere infectious to the distance of  
*thirty yards* only, any human means to  
stop the progress of this pestilence in  
a town or village would manifestly be  
most absurd.

EACH of these opinions was advanced  
by a Physician of the most extensive  
observation, and clear discernment, be-  
ing justly celebrated as the most emi-  
nent in the profession. And to such a  
degree do these notions prevail, that, I  
believe, if other medical men had been  
witnesses

## INTRODUCTION. 7

witnesses to the *facts* here alluded to, in both cases, many would have drawn the same conclusions.

IT will be most candid to confess that the *Theory* advanced in this INQUIRY, in nearly every instance, suggested the observation of facts. This being the truth, it will not be deemed an unnecessary caution that I have used, in adding the testimony of others, which may be thought more impartial than my own, concerning the facts that might appear most extraordinary, according to the prevailing idea on this subject. I allow that many false and even injurious medical Theories have been devised. But, on the other hand, I maintain, that unconnected facts afford no information; that facts are instructive and useful just in proportion as they are reducible to general rules or laws; and that true Theories, in this, as in other branches of natural philosophy

## 8 INTRODUCTION.

sophy, lead to a more exact relation of facts. No person could describe the effects of lightning so exactly as an electrician. Having observed that many medical theories are mere metaphors, and thinking all metaphorical language, on such subjects, a delusive and misplaced kind of elegance, I have endeavoured to avoid every figurative allusion. By this remark, I do not, however, mean to exclude arguments from analogy, a just mode of reasoning, founded on the uniformity of nature's works.

IN the year 1774, the natural small-pox was so dreadfully fatal to the poor inhabitants of Chester, as to produce a deep impression upon my mind, especially when I considered, that it was possible to prevent such destruction. Ever since that time, it has been an object of my most anxious wishes to preserve their lives by inoculation.

IN



IN 1777, when the small-pox was again epidemical, I ventured to propose a plan for this purpose; at first, for some months, privately, and in March 1778, publicly, which was not disapproved by the Faculty, nor by our most intelligent citizens. But this business was beset with so many difficulties, real and imaginary, that a general inoculation of the poor was not executed till 1780.

As I was meditating on some safe mode of general inoculation, I happened to write down my thoughts in order to consider more distinctly, by what means infection might be prevented from spreading, if such a measure were attempted. Doubts occurred to me concerning the opinions above mentioned. On farther consideration, these doubts increased, and I gradually became thoroughly convinced that both the opi-

C

nions



## 10 INTRODUCTION.

nions were erroneous, which have hitherto formed the bar, and, if they were true, the insuperable bar to all human means of preventing the small-pox. Though I have long acquired a perfect conviction upon these points, from the principles explained in the *INQUIRY*, yet a diffidence in disputing opinions which had been admitted so long and so generally among physicians, induced me to solicit the unreserved criticism of my friends, where ever I could take that liberty. For ~~fix~~<sup>seven</sup> years, these papers have been circulating among my medical and philosophical acquaintance; I requested them freely to state their objections, and to send me explicit answers to the *Queries* annexed to the *INQUIRY*: and to induce them to propose their remarks without reserve, I engaged not to publish their names, whether they approved or disapproved the doctrine I endeavoured to establish. I return, to these obliging correspondents

## INTRODUCTION. II

correspondents my grateful thanks, for this private favour, and acknowledge the cordial satisfaction which their approbation has afforded me. But, on this occasion, I willingly observe the promised silence, being desirous to convince by argument, not to persuade by authority. It may suffice to say, in general, that every objection with which I have been honoured, is fully stated in the INQUIRY, for the reader to form his own judgment on the subject.



A N

I N Q U I R Y

HOW TO PREVENT THE

S M A L L - P O X.

§ I.

*The Small-Pox is an infectious distemper.*

**T**HE truth of this proposition is proved, beyond all possibility of doubt, by the daily practice of inoculation.

§ II.

*The Small-Pox was never known, since its original commencement, to be produced by any other cause than infection.*

**T**HAT at present it is occasioned neither by climate, soil, nor season, but by



by infection *only*, seems highly probable from the following facts : The world had existed between 4 and 5000 years before history takes any notice of this distemper. It is universally allowed to have been originally endemic in or near Arabia. All Europe was infected from this place, and all other parts of the world that were then known, or have since been discovered. It did not appear in Greenland till 1733 : the infection was carried thither by a native returning home in the distemper from Copenhagen (*a*). In Minorca, it entirely disappeared from 1725 till 1742, that is, for 17 years. In 1745, it was again brought to Minorca by one of his Majesty's Ships. And there can be no doubt that the former infection was imported by some ship, tho' unnoticed by the author (*b*). At Boston in New-England, the Small-pox had been epidemic. . . . . demical

(*a*) Crantz's history of Greenland. B. 5. § 8.

(*b*) Cleghorn's diseases of Minorca. Chap. vijth.

demical only eight times, from the first settlement of the province of Massachusetts, till 1752, as appears from the following table, composed out of Dr. Douglass's (*c*) historical and political summary of North America :

Epidemical Small-pox at Boston.	Years. absent.
1649 - - -	
1666 - - -	17
1678 - - -	12
1689 - - -	11
1702 - - -	13
1721 - - -	19
1730 - - -	9
1752 - - -	22

BEFORE the epidemic of 1721, the small-pox was imported from Barbadoes ; before that of 1730, from Ireland ; and before that of 1752, from London.

AT

AT Rhode Island in America, this distemper was *never* epidemical, according to authentic intelligence which I have received from Dr. Moffatt, who practised physic at Newport, their capital, from 1740 till 1765; and from Dr. Waterhouse, a native of the Island. The former gentleman acquainted me with this fact, in these words, ‘ the small-pox was never epidemical during my residence at Rhode Island, nor before that I ever heard of. As far as I can recollect, there never was, at the same time, more than 5 or 6 ill of the distemper.’ Such an happy exemption is accomplished by regulations established there for the purpose (*d*). This proposition is capable of many other proofs, unnecessary to be here adduced, as at present, I believe, it is an opinion very generally received among physicians.

§ III.

(*d*) See Appendix to the INQUIRY.

## § III.

*The variolous poison is soluble in air.*

THE infection of the small-pox is termed a *poison* by medical writers, and with strict propriety.

IT is of importance to ascertain the mode of combination between the variolous poison and air. I apprehend that they are united by *solution*.

WHEN a clear menstruum has dissolved any substance, it remains perfectly transparent. This *test* of solution is founded upon a very extensive and uniform induction of facts, determined by accurate and numerous experiments in various kinds of menstrua, saline, inflammable, watery and aerial, without a single exception that occurs to my recollection. It may be imagined that the transparency of the solution does not depend on any chemical combination,



bination but on the natural transparency of the ingredients. But metals, earths, &c. are opaque bodies, yet, when dissolved, in their proper menstrua, the solution is perfectly transparent. On the contrary, if two transparent substances, that have no chemical attraction for each other, be agitated together, they will become opaque, as, water and oil, or air superfaturated with watery vapour. So numerous and so uniform are the facts on which this observation is founded, that it may justly be denominated a chemical principle, or *law of nature*.----To apply this law to our subject.

1. It is universally allowed, in this country, that the natural small-pox may be propagated without immediate contact of the patient or of the poison, and that the distemper is communicated from the infectious to the infected person thro' the medium of air. Variolous

olous matter applied to a wound, or to the inside of the nostrils (*e*), or to the whole skin (*f*), produces the inoculated small-pox. So that the natural small-pox appears to be *always* communicated thro' the air. Hence it is proved incontestibly that the pestilential effluvia, or *miasms* exist in the air near to

(*e*) Mead de variolis. Caput 5<sup>um</sup>.

(*f*) “ Quædam observata videntur docere, cuti adherere quandoque illud contagium, & deinde morbum producere. Vidi aliquoties, perfectâ sanitate fruentibus, unicam in cute pustulam attolli, rubere, dolere, suppurari, et cutim satis profunde exedere, cicatrice satis insigni relicta: paucis diebus postea variolarum morbus cum omnibus suis symptomatibus sequebatur. Audivi de aliis medicis, quod et idem aliquoties observaverint; imo mulierculæ, quæ variolis decumbentium custodiam agere solent, has pustulas *Moederpokken* solent vocare, tanquam sequentium brevi variolarum genitricæ, & audacter prædicunt, secuturum morbum. Plerumque in facie, talis pustula solet apparere, ferè semper unica, raro binæ vel plures; saltem non memini, me in praxi unquam plures quam binas vidisse, et semper scædiorem cicatricem relinquunt quam ipsæ variolæ.” Van Swieten Com. T. v. p. 27.

See also Phil. Transact. abridged, No. 375, and for 1768. xvij.

to a small-pox patient, or to variolous matter.

ANOTHER, and no less evident a proof of the existence of variolous miasms in air, may be inferred from their *peculiar* smell. The impregnation of liquids may generally be distinguished by the taste. Air cannot be tasted ; but smelling, the sense appropriated to that element, distinguishes the presence of variolous miasms, by a peculiar and offensive stench.

2. AIR, tho' strongly impregnated with variolous miasms, is perfectly transparent. The sight is the most acute of our senses, and could discover a very slight degree of opacity. If a single grain of magnesia be agitated in a quart of clear water, its white particles are visible in every drop of that water. A pound of bitter cathartic salt might be dissolved in a quart of water,



water, and, when thus combined, cannot be discerned: we may therefore reasonably conclude that it becomes invisible; for a grain of this salt added after full saturation, remains visible. Small particles floating in air, are as distinguishable as particles floating in water. Again, the quantity of air applied to the organ of smell is small compared with what is pervaded by the organ of sight. It is true, that a few particles of dust, not visible in a shaded chamber, being of the same colour as the surrounding objects, may be distinctly seen by a ray of sun shine admitted into the chamber. The rays of the sun render objects of every colour bright, and the dark shade behind them sets off these bright objects most distinctly. I have, several times, exposed the air impregnated with various miasms, to a ray of sunshine, let into a dark chamber, but could never observe that it was visible, not even  
in

in the most infectious state of the confluent small-pox, immediately issuing from the pustules. However, I would by no means maintain, that air is never supersaturated, and consequently rendered visible, by variolous miasms.

3. If a solvend be put into a less quantity of menstruum than can dissolve it, after fully saturating the menstruum, the remaining solvend continues unchanged, and capable of impregnating a larger proportion of menstruum. In like manner, when the variolous poison is put into a small portion of air only, it continues capable of impregnating more air, and a part of the poison remains undissolved. Thus inoculators keep variolous pus close corked up in small phials, that the air may not dissolve all the infection contained in it. I have seen the variolous pus remain, in a close corked phial, in a half fluid state, for several months,

months, not being inclosed with a quantity of air sufficient to dissolve the moisture.

4. THIS theory is confirmed by a very extensive and uniform *analogy*. The perspiration of vegetables, which Dr. Hales has proved to be very copious, and the insensible perspiration of animals, are perfectly invisible. If the effluvia are supposed to consist of such minute particles, that the eye cannot distinguish the perspiration of one man or one leaf; yet when we view, in one direct line from the eye, thousands of men, or millions of leaves, their accumulated perspiration must be distinguished, if they diminished, in the slightest degree, the transparency of the air. Not only the well-established theory, that water is soluble in air, confirms the doctrine here advanced, but, I apprehend that the phenomena of all volatile substances, whose



whose vapour is invisible, are manifestly explained on the same principle. The mode of combination between the variolous poison and air seems *extremely analogous* to the combination of all invisible odours with air, that is, by solution. The air is rendered odoriferous without diminishing its transparency, by an infinite variety of substances, of which the variolous poison itself is one.

#### § IV.

*If TWO persons be exposed, for the first time, to the variolous infection, they very rarely both escape catching the small-pox; and, if THREE persons be exposed together, they much more rarely all remain uninfected.*

IF a person, who had not had the small-pox, were *always* to catch the distemper, whenever exposed to the variolous infection; it would follow, as  
an

an undoubted conclusion, that if such a person had not been attacked, therefore certainly he had never been exposed to the infection. But the facts are more complex, and the conclusion less obvious. Indeed, in my opinion, a want of due consideration of these facts, has occasioned the most erroneous conclusions. I request the reader's particular attention to this point, as many of the following arguments principally depend upon it.

PHYSICIANS allow, I believe universally, that neither inoculation, nor breathing the variolous miasms will produce the small-pox in every person who never had the distemper. The proportion of mankind incapable of infection has been estimated by authors of high authority to be 1 in 20 (g). There is an opinion very generally

(g) Sauvages Classis iij. Genus, 2dum. Rosenstein's diseases of children. Chap. xij.

rally prevails, which is probably well founded, that some persons are incapable of infection at one time and yet are infected at another. I do not know a sufficient number of facts of this kind to ascertain what proportion of mankind is liable to this temporary incapacity of receiving the infection. It is certainly a very small proportion; indeed so small that some, of very extensive observation, have doubted whether it exists at all. From a general recollection of the imperfect evidence produced on this subject, I should conjecture, that it does not happen once in several hundred, or more probably in several thousand instances: if so, the proportion above stated of 1 in 20 will be altered a very small fraction only, by this temporary incapacity.

It occurred to me, that it might be computed arithmetically, by the doctrine of chances, according to these data,



data, if *one*, if *two*, or if *three* persons were exposed, for the first time, to the variolous infection, what degree of probability there was that one or more of them would catch the distemper. At my request, a mathematical friend made the following computations, on each supposition.

‘ If there be 1 person in 20 who is  
‘ not liable to the small-pox, it is  
‘ therefore evident that, for any par-  
‘ ticular person, there are 19 chances  
‘ that he may be infected, and only 1  
‘ that he cannot. Hence we may rea-  
‘ son, however epidemical the small-  
‘ pox has been in a town, that a child  
‘ who has escaped the distemper, was  
‘ never exposed to the infection (un-  
‘ less we know the contrary) is proba-  
‘ ble, in the degree of 19 to 1. If 2  
‘ in a family have escaped, the proba-  
‘ bility that they were never both ex-  
‘ posed is above 400 to 1: if 3 in a  
E 2                      family,

‘ family have escaped, above 8000 to  
‘ 1 (*b*).

BUT

(*b*) My ingenious friend, - Mr. Dawson, a truly mathematical genius, not unknown to some of the first philosophers of the age, favoured me with this calculation. To Dr. Stewart professor of mathematics at Edinburgh, and to Dr. Horsley late secretary to the royal society, he first suggested some mathematical doubts in regard both to their principles and calculations, for ascertaining the distance of the sun, by the theory of gravity. With Mr. Emerson, he had some mathematical disquisitions, concerning the precession of the equinoxes. I had intended to subjoin Mr. Dawson’s demonstration : but, to the mathematical reader it would be superfluous, and to others useless. To mention the data and conclusions may be sufficient. ‘ This calculation depends not only on the proportion of 1 in 20 naturally exempted from the small-pox ; but likewise on the number of inhabitants in the place where the small-pox is epidemical, who have never been previously exposed to the variolous infection. This number varies greatly at different times and places, which produces some variation in the calculation. For example, let this number be supposed 350. If then 2 in a family have both escaped, the probability that they were never both exposed is as 422 to 1 ; if 3 have escaped, as 9496 to 1. If the number who have never been exposed to infection be infinite ; when 2 or 3 together have escaped the distemper, the chances that they have not been exposed to the infection are as 399 to 1, and 7999 to 1 respectively.’

BUT as these calculations may not produce general conviction, there is another method, by which any person, who will take the trouble, may satisfy himself that this argument has a just and true foundation. Let twice 20 or 40 white peas be put into a box, and mark 2, or every 20th pea, with ink, and take out 2 at a time without seeing them. He will *very rarely* take out the 2 marked peas together. If thrice 20 or 60 peas be put into a box, if 3 of them be marked, and if 3 peas be taken at a time, the 3 marked peas will *much more rarely* be taken out together. This is obvious to common sense, and any one, who has patience to make the trial, may have actual proof.

HENCE we may conclude, when 3 or more persons together, in the same place, and at the same time, have all escaped the small-pox, that they were not exposed to the variolous infection.

I CAN



I CAN add an argument which strongly confirms this calculation of chances, and may be regarded by many as more conclusive than any calculation. I have asked the following question, and obtained answers from 26 physicians and 5 surgeons, all eminently distinguished for their medical knowledge and extensive practice. ‘ Did you ever know  
‘ 3 or more persons, at the same time  
‘ and place, all escape the small-pox,  
‘ after being certainly exposed, for the  
‘ first time, to the infection, either by  
‘ inoculation with genuine fresh matter, or by breathing the air of a  
‘ chamber in which the variolous smell  
‘ was perceptible ?’ None of these gentlemen mention a single instance of 3 together escaping, after exposure to infection. And I have only been informed of two instances, where 2 together both escaped.----This observation is not applicable to young infants,  
who

who are, it is well known, less liable to catch the distemper (*i*).

### § V.

*The period between infection and the commencement of the variolous fever is generally from the 6th to the 14th day inclusive, after inoculation : and this period is not much longer in the natural small-pox.*

THE only proof that can be given of this proposition is by an induction of facts. A great number of facts would be required to deduce any certain conclusion. No one probably has had more experience in inoculation than Baron Dimisdale, to whom mankind are so highly obliged for communicating the improved method of conducting this process. In a letter from the Baron, I was favoured with the following important observation, and have leave to mention it in his name, which, on this subject,

(*i*) See Monro on inoculation, p. 25.

subject, will be allowed of the greatest authority. ‘ In the improved method of inoculating with fluid matter, the eruptive fever, in every instance within my experience, commenced on some day from the 6th to the 14th, both inclusive. I have not known one instance later (*k*).’

THIS period, in any particular case, can be accurately ascertained in the inoculated, but with much more difficulty in the natural small-pox. However, for the purpose of this inquiry, it would be useful to approach the truth as nearly as we can, in the natural infection. I will circumstantially relate some facts to illustrate this point.

1st Case. A daughter of the late rev. Mr. Harwood’s passed very near, but did not touch, a child who had the small-

(*k*) See also the same remark in Monro on inoculation, p. 21st.



small-pox, in the *row* (a kind of covered gallery, open on one side to the air) at the bottom of Northgate-street, Chester, and sickened of the distemper on the *eleventh* day, after this infection.

2d Case. Nov. 21, 1780. Miss M. Bennet, whose father is Master of a ship at Liverpool, went thither from Chester, where there was only one small-pox patient, with whom she had no connection. On the night of her arrival at Liverpool, she went into a house among children who had the small-pox; some of them, whose scabs were dry but not dropt off, touched her hand. She sickened on the 3d of December, that is, on the *thirteenth* day after infection. As there might be some suspicion that this patient was infected by her skin touching the variolous scabs, it may be necessary to mention that I examined her hands to see whether there was any appearance of inoculation, but discovered none.

3d Case. A daughter of Mr. Mofs, watch-maker, went on Sept. 21st, 1780, from Frodsham, in which town and neighbourhood there was not a small-pox patient, to Liverpool, where the distemper was epidemical. She returned to Frodsham on Oct. the 1st, and on that day the eruptive fever began, that is, on the *eleventh* day from her arrival at Liverpool.

4th Case. A medical correspondent informed me, that ‘ Plumb Simcock’s  
‘ eldest child was at school where Tom.  
‘ Mofs’s child the clock-maker went,  
‘ with some of the eruptions upon it,  
‘ on the 21st of Dec.; on the 31st the  
‘ the child sickened,’ that is, on the *eleventh*.

Cases 5th and 6th. In Nov. 1781, two children of Mr. Burges’s of Helsby, who were to have been inoculated, were  
secretly

secretly taken by a servant to a patient in the small-pox, on purpose to catch the natural infection. The eruptive fever commenced, in both, on the *eleventh* day of infection. Mr. Jackson, surgeon, of Frodsham can witness that the 4 last cases are accurately stated.

7th Case. On the 6th of Nov. 1777, Master H. A. met a child ill of the small-pox on the walls of this city, as will be hereafter more particularly related; his eruptive fever commenced Nov. 15th, that is, on the *tenth* of infection:---In all these cases, except the 4th, the dates were exactly ascertained to me by the parents, at the time when they happened.

8th Case. Mr. Dawson of Sedbergh in Yorkshire, acquainted me, by letter, with the following fact: ‘ A child was prepared for the small-pox. But the mother, averse to inoculation, carried



‘ it to an infected house, about a mile  
 ‘ off. This was Sunday afternoon a-  
 ‘ bout three o’clock, and Monday the  
 ‘ first but one after, nearly about the  
 ‘ same hour, the child sickened ;’ that  
 is, on the *ninth*.

9th Case. The widow of the late  
 H. V. Esq. had escaped the small-pox  
 till her 65th year. On a Saturday, she  
 was visited by a female acquaintance,  
 whose family had the distemper, who  
 lay with her that night, and returned  
 home on the Sunday. On the Tuesday  
 se’nnight following, Mrs. V. sickened  
 of the small-pox, that is, on the *eleventh*  
 day after infection. I had this infor-  
 mation from the family when the event  
 was recent, and Messrs. Brodhurst and  
 Williamson are also medical witnesses  
 of the fact.

*See p<sup>224</sup>*

To discover whether any difference  
 could be observed in the period between  
 infection

infection and the variolous fever, in the natural, and inoculated small-pox, I compared nine cases, taken indiscriminately by inoculation, with the nine cases above related.

Fever commenced after infection in the

Inoculated Small-pox.		Natural Small-pox.	
No. Cases.	Day.	No. Cases.	
3	8th	0	
5 - -	9th - -	1	
0 - -	10th - -	1	
1 - -	11th - -	6	
	13th - -	1	
<hr/>		<hr/>	
9		9	

HENCE it would seem, as far as these few facts bear evidence, that this period is about two days longer in the natural than the inoculated infection.

NONE of these cases prove, that there is much difference. I have had, however,

ever, authentic information of two facts, that, at first view, seem exceptions to this proposition, in regard to the natural infection, the one being apparently longer and the other shorter than the period here mentioned. ‘ A girl of 14  
‘ years old came from a part of the  
‘ country where there was no small pox,  
‘ entered a chamber, unexpectedly, where  
‘ there were several patients in the distemper, and was greatly alarmed.  
‘ She was immediately struck with a  
‘ pain in her back, which continued  
‘ several hours. This happened on  
‘ Thursday; she was quite well on Friday and Saturday, became feverish  
‘ on Sunday, the *fourth* day from the  
‘ interview, and the eruptions appeared  
‘ on the Wednesday.’ Tho’ I had this information from a most intelligent and faithful observer, yet it is possible that the girl might have been previously infected, which often happens without our knowledge. Besides, there is great  
reason



reason to think that the period between infection and the eruptive fever is not shorter, but probably somewhat longer in the natural than the inoculated small-pox ; otherwise, the patients which often breathe infectious air at the time of inoculation, would be liable to the fatal effects of the natural small-pox, and the event must much more frequently prove unfortunate.

I WAS acquainted by letter, with the following fact, from a physician justly celebrated for his medical knowledge and discernment. ‘ In 1757, the remains of Sherley’s and Pepperell’s regiments were embarked at New-York, where the small-pox was, for Boston, where the disease was not. On the the 20th and 21st day from their embarkation, eight men were seized with the small-pox.’ I inquired ‘ whether some shirt, handkerchief, cloth, &c. bedaubed with variolous matter

‘ matter might not possibly have been  
‘ taken aboard a transport unwashed  
‘ so as to infect the soldiers after their  
‘ departure : and whether the eight  
‘ infected soldiers were in the same  
‘ quarters on shore, or sailed in the  
‘ same transport. If they were in sepa-  
‘ rate quarters, and the same transport,  
‘ it would increase the probability of  
‘ their being infected after embark-  
‘ tion.’ I received the following answer.  
‘ I do not know whether the soldiers were  
‘ quartered in the same house, whether  
‘ they belonged to the same company,  
‘ nor whether they sailed in the same  
‘ ship, nor how their linen was washed.’  
Hence I infer, that tho’ this fact is ve-  
ry curious, it affords no positive proof  
that the infectious period was longer  
than above stated. Some variolous  
matter might possibly have been con-  
veyed aboard the transports, and in-  
fected the soldiers, *after* their embark-  
ation.

As I could not obtain a competent number of facts, where the hour or day of infection was exactly known, I have attempted to determine this point by the following method. I requested Mr. Owens, inspector to the society, to note down, in his register of the small-pox, the day of the month, when each child of the family first complained of the eruptive fever. The accuracy of the register I can confirm, in many instances, from my own knowledge. As opportunity offered, I collected other facts from information equally authentic. In that part of the register, which will be inserted in the ixth proposition of this INQUIRY, the 7th family is noted down in

this manner, column IIIId.  $\left\{ \begin{array}{l} \text{1st May 30} \\ \text{2d June 14} \end{array} \right.$

which signifies that the 2d child was attacked on the 16th day after the first, reckoning inclusively, in that family. The following arrangement of facts

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comprehends 37 cases that first occurred, and marks the day when the variolous fever began, after the first in a family was attacked.

Day	No. of Patients.	Day	No. of Patients.
3d	1	15th	6
7th	1	16th	5
8th	1	18th	7
11th	4	21st	1
12th	2	22d	2
13th	3	23d	1
14th	3		

—37

IN order to deduce a proper conclusion from these facts, it will be necessary to determine how soon after the commencement of the eruptive fever, the patient becomes infectious to others in the same family. In the proof of the next proposition, it will appear probable, that bed-fellows, in some instances, do not receive the infection till the 6th day of the fever or later. Taking this

this point for granted, it follows, that 33 out of the 37 cases, in this table, afford no proof that infection preceded the eruptive fever longer than the 12th day.

IN regard to the four cases, whose eruptive fever commenced on the 21st, 22d, and 23d days, it does not seem improbable that among such a number as 37, so few as four might escape infection till the 7th, 8th, or 9th days, the period when the distemper becomes most infectious. I have the following reason to believe that it was actually so in the patient who was seized the 21st; this was in a family where there were four children who had never been exposed to the infection. When the eruption appeared on the first patient, which was on the 4th day of the disease, the other three were separated from it; two of these went out of the house on the 6th day, not infected; the 4th was kept

separate till the 11th day and was seized on the 11th day after the interview, that is, on the 21st day after the first patient was attacked.----It is proper to explain that all these cases were taken from the poorest families, among whom the intercourse was very intimate, living in the same room, and generally lying in the same bed, and not kept at a distance, by fear either of their parents or themselves, in any instance that I know of, except that above related.

MANY other cases, to the same purpose, have occurred to me, which I have not arranged in the table, as these may give presumptive evidence in support of the proposition, but it is incapable of absolute proof by any number of facts that I could produce.

I HAVE received information of several well authenticated cases where inoculated



culated patients have not become feverish till several days after the 14th, tho' I believe they were not inoculated with fluid matter.'

THE two following cases appear not only curious, but instructive. Where the connection is the closest possible, that is, between a mother and the child in her womb, they shew at what distance of time after the mother is attacked, the distemper begins in the child.

‘ FÆMINA septimo gestationis mense  
 ‘ variolis malignis correpta est Fili-  
 ‘ um, nullis morbi notis in corpore se-  
 ‘ prodentibus, die undecimo enixa, de-  
 ‘ cimo quarto e vitâ decessit. Infans  
 ‘ autem, cum quatuor dies postea vixe-  
 ‘ rat manè convulsionibus morbi præ-  
 ‘ nunciis, correptus, vesperi protiusis  
 ‘ variolis, interiit. Liqueet hic, per-  
 ‘ fecta die undecimo, ut fieri solet, ali-  
 ‘ quanta

‘ quanta suppuratione morbum mater-  
 ‘ num in foetum tranſiſſe, diebus octo  
 ‘ elapſis, in tenero corpore renaſciturum’  
 (l). Hence the child was attacked by  
 the ſmall-pox on the 18th day after his  
 mother. This caſe of the celebrated Dr.  
 Mead, which, he ſays, that he had *lateſly*  
*ſeen*, is confirmed by one who is not a leſs  
 judicious and accurate obſerver, John  
 Hunter, Eſq. F.R.S. In the Philoſophi-  
 cal Tranſactions (m), he relates the caſe  
 of Mrs. Ford, whoſe ſmall-pox appear-  
 ed on the evening of the 8th of De-  
 cember. She was delivered on the 31ſt,  
 that is, on the 24th day from the erup-  
 tion. The child had puſtules filled  
 with matter, when born, which appear-  
 ed about the 6th or 7th day of the erup-  
 tion. Hence the eruption in the child  
 muſt have happened about the 18th or  
 19th day after the mother’s.

(l) Mead de variolis, p. 65.

(m) Vol. for 1780. § viij.

If we may take for granted, that infection does not precede the eruptive fever longer than the 14th or 16th day, it follows, in both these cases, (1st,) that the child was not infected at the time the mother was infected, (2d,) nor during the mother's eruptive fever. It seems probable that the children were infected after the variolous serum or pus had been formed in the pustules, and had returned into the blood by absorption.

THERE is an opinion so utterly groundless, that it would never deserve any notice, if it did not too generally and fatally prevail, so as to produce the mischief it is intended to prevent. It is imagined that the *change of air*, even from an infectious to a healthy situation, occasions the disease. As there cannot possibly be any just foundation for this suspicion, we may inquire what false reasoning has given rise



rise to so absurd a notion. Between the time of infection, and the commencement of the disease, there is an interval of several days: during this interval, infected persons may have removed, from the neighbourhood of the small-pox, to a distance from it, and, soon after the removal, may have been seized with the distemper. But it cannot be doubted that the infection would as certainly have had this effect, if the patient had remained in the former situation.

### § VI.

*Persons liable to the small-pox, are infected by breathing the air, impregnated with variolous miasms: Either (I) very near a patient in the distemper, from about the time that the eruption has appeared 'till the last scab is dropt off the body, or (II) very near the variolous person, in a recent state, or (III) that has been close shut up, ever since it was recent.*

I. As

I. As no medical man, in this country, doubts that a patient in the small-pox communicates an infectious quality to the air that furrounds him, we need only inquire, at what time of the disease, this pestilential emanation from his body begins and ceases.

I. I HAVE not been able to obtain a sufficient number of facts, to ascertain, with precision, on what day of the disease a patient becomes infectious. But the following evidence will warrant a probable conjecture, that, before the eruption appears, the patient is seldom or never liable to communicate the distemper.

1st and 2d Cases. I attended a little boy in the small-pox, whose eruptions, of the distinct kind, appeared on the 4th day of the fever; his two sisters, on their appearance, were removed out  
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of the house. One of them became feverish on the 11th day after her removal; the other was not attacked till 7 weeks after, on being exposed to another infection. As the former sister was only removed to a neighbouring house, there may be some doubt whether she might not be infected by some future communication; the other was sent to a much greater distance.

3d and 4th Cases. A gentleman's child became feverish on the Sunday; two others of his children were daily in the same room, and one of them lay every night with the patient 'till Friday (the 6th day) and were then removed; yet neither were infected, tho' the pustules had appeared a day or two before: one of them was inoculated soon after and had the distemper.

5th Case. The fact related, p. 43d, to prove another point, may be adduced



duced in evidence again, on the present subject. ‘ In a family where there  
‘ were four children who had never  
‘ been exposed to the infection, when the  
‘ eruption appeared on the first patient,  
‘ which was on the 4th day of the  
‘ disease, the other three were separated  
‘ from it’ and escaped infection.

BUT, as I confess that the cases which have come under my own observation are manifestly too few to discover the truth, I am happy to add the testimony of my most respectable and ingenious friend Dr. Heberden, in confirmation of what I had advanced. In a correspondence with which he has long honoured me, he communicated the following observation, which I have leave to mention on his authority. ‘ Many instances  
‘ have occurred to me, which shew,  
‘ that one who never had the small-pox might safely associate, and even  
‘ lie in the same bed with a variolous  
H 2                    ‘ patient,

‘ patient, for the two or three first  
 ‘ days of eruption, without receiving  
 ‘ the infection.’

By comparing this observation with the facts contained in the table, (p. 42d) it appears, that when one person is accidentally seized with the small-pox in a family where others are liable to it, the rest may generally avoid the natural infection, either by separation or immediate inoculation.

MATURATION appears to be the season, when the variolous miasms are emitted most copiously; the poisonous pus being exposed, at that period, naked to the air, according to the accurate description of the faithful Sydenham. ‘ *Usque ad hunc diem*’ octavum a primo insultu ‘ *pustulæ, quæ*  
 ‘ *faciem obsederant, læves ad tactum*  
 ‘ *fuere atque rubræ, jam verò asperiores*  
 ‘ *evadunt* (quod quidem primum  
 ‘ *est*

‘ est incipientis maturationis indicium)  
 ‘ et subalbidæ, paulatim insuper *succum*  
 ‘ quendam luteum, colore a favo non  
 ‘ abludentem, *evomunt.*’ (n)

2. It is also of great importance to ascertain, at what time a patient ceases to be infectious. As long as a variolous scab remains, it undoubtedly contains the poison in a concentrated form. After all the scabs have dropt off, I should conjecture that no infectious quality could be suspected to remain in the body, there being such a quick discharge of every thing offensive to the constitution by the numerous excretions. This conjecture has been confirmed by the uniform experience of the small-pox Society. However, the skin, hair, &c. may have variolous matter adhering to them, unless they be sufficiently cleaned.

(n) Syd. Opera, p. 134.

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IN an inquiry how to prevent the small-pox, it is a point of consequence to determine, *how long the variolous poison remains on the patient's body.* I have collected some authentic facts on this subject, chiefly from the register of the small-pox society. Out of 90 *single* patients, the shortest continuance of the poison was to the 10th, and the longest to the 40th day, from the commencement of the variolous eruption, till the last scab dropt off, and, of these, only 16 were later than the 28th day.

IN a *family*, where *two* patients are liable to the small-pox, one catching the distemper from the other; out of 31 cases, the shortest duration of the poison was till the 18th, and the longest till the 53d day after the eruptions appeared on the first: and, of these, only two were later than the 43d day.

IN a *family* where *three* patients were to have the small-pox ; out of 7 cases, the shortest was the 23d, and the longest the 63d day.

THESE facts shew, for what length of time, a family, in the natural small-pox, continues infectious ; when, by their unreserved intercourse, they catch the distemper, as soon as it becomes infectious.---Indeed, I suspect that there ought to be a considerable abatement of this period, in several instances. When the *variolous* scab is torn off sooner than it would naturally drop, another scab succeeds, which probably contains no variolous poison : but I believe the time above noted is when the last of the latter scabs, dropt off.

THAT the serum pus and scab of the pustules of the small-pox are infectious, is universally allowed. That the breath  
and

and insensible perspiration of a patient are infectious, nobody disputes. Are the breath and perspiration impregnated with the poison, from the pustules which arise in the mouth and on the surface of the skin? Neither the breath nor the perspiration seem to be infectious till the pustules appear, as was before rendered probable, (see p. 49--52.) What other fluids that are contained in, or discharged from, the body, may be deemed poisonous, is a question that I believe has never been considered, much less determined, tho' capable of determination; at present, the observations that have been made, are too few and too vague to form a probable conjecture. The saliva is most suspicious; and indeed little doubt can be entertained of its infectious quality, especially in the salivation produced by the confluent small-pox. It may however be doubted, how far this infectious quality is occasioned by the variolous  
poison



poison which issues from the pustules in the patient's mouth. The two cases related in the proof of the last proposition, where infants in the mother's womb were not infected, 'till the time of the disease when the variolous poison is absorbed from the pustules into the blood, seem to warrant a doubt whether the patient's blood becomes infectious any farther than by this poisonous admixture.

HOWEVER, all the discharges of a small-pox patient, either of themselves, or the probable mixture of serum, pus, or scab may be infectious; and ought to be destroyed by cleanliness, in order to prevent the propagation of the distemper.

IF these observations be well founded, some important conclusions may be deduced from them. During the eruptive fever, there will be no danger of spread-

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ing the distemper, by exposing the patient to the open air ; but, after the eruption, when maturation begins, due care must be taken to prevent any communication with those who are liable to infection. These circumstances happen fortunately for the patient. The late practice of inoculation has evinced that exposure to fresh air during the eruptive fever is of important service. In the disease from inoculation, and the milder kind of natural small-pox, as soon as the eruption is completed, all apprehension of danger to the patient generally ceases. But should the number or kind of pustules, or the remaining symptoms require any farther exposure to the fresh air, it ought to be done in some unfrequented place, or, when that is impracticable, by opening the door and windows of the patient's chamber. At least, it is certain, when the 2d fever is over, that the open air is in no respect necessary towards a perfect

fect recovery, all danger vanishing at that period of the disease. Yet, at this time, while patients remain in a most infectious state, they at present have the most unreserved intercourse with children liable to the distemper, and become wantonly destructive to their fellow-creatures.

II. THAT ‘ persons liable to the ‘ small-pox are infected by breathing ‘ the air, very near the variolous poison in a recent state’ is a medical opinion so well established as to require no proof. Let us reflect how widely and fatally this poison is dispersed among all ranks of people. It may be conveyed into any house, unobserved, from a great variety of families, adhering to clothes, food, furniture, &c. as,

*Clothes,* 1. Linen. 2. Cotton. 3.  
Woollen, particularly flannel. 4. Silk.  
I 3 5. Mil-



5. Millenary goods. 6. Stockings. 7. Stays. 8. Gloves. 9. Shoes.

*Food.* 10. Bread. 11. Cakes. 12. Huxtery. 13. Fruit. 14. Butter. 15. Milk. 16. Sugar and other groceries. 17. Salt. 18. Tea. 19. Nuts. N. B. Food boiled or roasted at home is probably not infectious.

*Furniture, &c.* 20. Earthenware, 21. Hardware. 22. Dolls and other toys. 23. Pens. 24. Paper. 25. Books. 26. Letters. 27. Money.—28. Medicines.

TEN fold more articles might be enumerated ; besides, several of these I have mentioned, as, linen, &c. include 4 families each, who, by this means, may communicate the distemper, namely, the feller, maker, washer and wearer.

So minute a detail of self-evident causes may be thought superfluous. But I would rather suffer this censure, than leave a single doubt in the reader's mind concerning the numerous means by which this fatal poison is dispersed, so generally and so carelessly among mankind.

THE clothes of a patient generally contain the largest quantity of various poison. However, all the enumerated articles, and many more, that come out of an infectious house, or from an infectious person, find their way unsuspected into all families of a certain rank.

THE poison is quickly and universally dispersed among the lowest class of people, whose poverty renders them dirty.

It

It should be remarked, that children, who are most liable to the small-pox in all other respects, generally put every new thing that they can lay hold of to their mouth, and are taken into the arms of many in a family, so as to expose themselves to infection from their clothes. These considerations point out numerous and indubitable means of propagating the distemper. Indeed the causes of this kind are so various, that one would expect the disease to spread much more rapidly than it does in fact: an event not be accounted for, but by supposing, what is confirmed by other circumstances, that the atmosphere quickly dissolves the contagion, and renders it harmless by dilution, as hereafter explained.

III. THAT ‘ the variolous poison, ‘ which has been close shut up, ever since ‘ it was recent,’ long retains an infectious quality,



quality, is proved by the most authentic evidence. This truth is clearly demonstrated by the well-known practice of inoculators, who keep variolous matter in close corked phials, for many months, without losing its infectious quality. In China, the inoculators take the skins of some of the dried pustules; which are fallen from the body, and put them into a porcelain bottle, stopping the mouth of it very close with wax, by which method of preservation, the contagion is said to be retained for some years. Indeed these scabs seem particularly well adapted to retain the variolous poison. Their moisture has been gently evaporated by the heat of the body. In this dry state, they would not be likely to undergo any change by putrefaction, or other kind of fermentation.

‘ ABOUT 1718, a ship, from the  
‘ East-Indies, arrived at the Cape of  
‘ Good-

‘ Good-Hope : in the voyage, 3 chil-  
 ‘ dren had been sick of the small-  
 ‘ pox : the *foul linen* about them was  
 ‘ *put into a trunk and locked up.* At the  
 ‘ ship’s landing, this was taken out,  
 ‘ and given to some of the natives to  
 ‘ be washed : upon handling the linen,  
 ‘ they were seized with the small-pox,  
 ‘ which spread into the country for  
 ‘ many miles, and made such a deso-  
 ‘ lation that it was almost depopula-  
 ‘ ted.” (d)

FROM a variety of considerations, I  
 am inclined to believe that the most  
 usual method of transferring the small-  
 pox to a distant place, is, by sending to  
 relations and acquaintance, clothes, &c.  
 bedaubed with the variolous poison, ei-  
 ther shut up in boxes ; or, what has a  
 similar effect, folded up in clothes, pa-  
 per, &c. so as to exclude all access of

(d) Mead on the plague, p. 1. ch. ii.

fresh air. It has been remarked, that relations, at a distance, are infected by this distemper, nearly about the same time. This event, I believe, often happens, from a communication of dirty clothes, &c. and sometimes possibly from a letter. Whoever reflects that a piece of paper on which a letter is written, may have lain on a bed, where there is, or has been, a small-pox patient, or on a table, chair, &c. where the foul handkerchiefs, cloths, &c. are thrown, or may be besmeared with variolous matter, by the unwashed hands of a servant, a correspondent or a patient; that the letter is folded up carefully, so as to exclude the air; that, when opened, it is held near the mouth and nose to be read; and afterwards a child puts it into the mouth; will not be surpris'd that it may sometimes communicate the infection. ‘Hujus rei sat  
 ‘probabile exemplum reperire mihi vi-  
 ‘sus sum, quum nullæ omnino, ante  
 ‘aliquot annos, hic loci notarentur va-  
 K riolæ.



‘ riolæ. Puella *litteras* aliunde a fratre  
 ‘ suo, qui morbo isto ibi tunc epide-  
 ‘ mio laborabat, acceptas gestarat se-  
 ‘ cum, per aliquot dies : et en ! nil me-  
 ‘ tuens aut cogitans, subito eadem lue  
 ‘ cæpit affligi, contagiumque deinde  
 ‘ cum ceteris contubernalibus quatuor  
 ‘ communicavit, unde id in aliam quo-  
 ‘ que domum translatum est, eamque  
 ‘ pervagatum cessavit.’ (*p*)

THAT the causes above assigned for  
 the propagation of the small-pox are  
*true*, no medical man will doubt ; name-  
 ly, the near approach to a patient, or  
 to variolous serum, pus, or scab, by  
 any person susceptible of infection.

THAT these causes are *sufficient* to  
 account for the distemper, in all cases,  
 will not appear improbable, to any one  
 who duly considers the innumerable  
 methods by which this poison is dis-  
 persed among mankind.

(*p*) Werlhoffii opera, p. 487.

HOWEVER

HOWEVER, two objections will very generally be made to this conclusion, which shall be particularly considered in the two following propositions.

### § VII.

*Clothes, furniture, food, &c. exposed to the variolous miasms, never, or very rarely become infectious.*

THAT variolous miasms may be retained in clothes, furniture, chambers, food, &c. so as to communicate an infectious quality to the neighbouring air, is the generally prevailing opinion, nor do I know that it has ever been disputed (*q*). But if we examine this point with attention, I trust it will appear, that it is an opinion, nearly, if not entirely groundless. This conclusion may be deduced from the simplest and best established principles of chemistry. It has been proved that the variolous poison is united to air by *solution*

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(see

(*q*) See the Introduction, p. 4.

(see § iij). Chemical attraction is the cause of solution, as appears from the clear evidence of innumerable experiments. Chemists have employed much labour and ingenuity to ascertain the various degrees of this attraction, between almost all the different substances that nature presents to their examination. The degree of attraction between the same substances, in the same circumstances, is always uniformly equal. Now whether it be supposed that air attracts the variolous miasms more strongly than clothes, &c. do, or that clothes, &c. attract the miasms more strongly than the air does, the argument will be conclusive against this opinion. For if air attract the miasms more strongly than clothes, &c. do, it is evident that the miasms could never be taken from the air in order to adhere to the clothes, &c. On the contrary, if clothes, &c. attract the miasms more strongly than air does, it follows



follows that such miasms could never be taken from them by the air, and consequently they could never render it infectious.

It may not be improper to take notice of some facts, which, to an inaccurate observer, may seem exceptions to the chemical principle on which this argument is founded. Clothes, it is well known, after being exposed, in a chamber, to the smoke of tobacco, will communicate these effluvia to fresh air, as is manifest to the smell. In a chamber where much tobacco has been smoked, a part only of the smoke is *dissolved* in the air; and the rest floats about in a visible form, being in a state of *diffusion*. In this case, the fact seems to be, that tobacco smoke adhering to the clothes, is afterwards dissolved by the air. The circumstances of the effluvia of tobacco and the variolous miasms are essentially different. The smoke attracted  
by

by clothes is not dissolved in the air, but diffused in a visible form, in which state it has no chemical combination with air. Whereas the variolous miasms are perfectly dissolved in the air, and consequently could not combine themselves with the clothes, unless they had a stronger attraction to the clothes than to the air; in which case, they would remain in combination with the clothes. Besides, it seems evident that the smoke of tobacco is not all soluble in air. This like all other substances whose inflammability depends on oil, probably leaves an indissoluble foot. The pipe, and the walls, cieling, &c. of a room where there has been much tobacco smoked, soon acquire a dark colour, probably from the foot which remains undissolved. A part of this foot may stick to the clothes, and continue to emit soluble effluvia. That the air dissolves a considerable proportion of tobacco smoke is evident; a  
chamber

chamber often smells strongly of tobacco, tho' no smoke is visible. In such a chamber, do clothes acquire the smell of tobacco? I have received the following information from a very accurate and intelligent observer. ' In travelling, I have often breakfasted in a room of an inn, where company has smoked the night before; and, after returning to my chaise, have perceived my clothes smelling of tobacco.' In this case, might not some smoke remain in a diffused state? a ray of sunshine discovers smoke not visible in the shade, as I have often observed. Or, did some foot stick to the gentleman's clothes by touching a table, chair, &c.?

Another apparent exception to the principle may be suggested by the following fact. Woollen clothes become damp in a moist air, and lose their dampness in a dry air, that is, in the first case, the watery particles, which are  
*diffused*



*diffused* in the supersaturated atmosphere adhere to the clothes, and in the last, the dry air *dissolves* the water retained by them.

CLOTHES exposed to the offensive stench of a privy, generally retain no smell. However, I have been informed, on good authority, that some privies impart a disagreeable smell to clothes. May not this fact be explained on the principles here advanced? If the air of the place be supersaturated with this noisome vapour, the effluvia, in a diffused state, may be attracted and retained by clothes, till carried into fresh air where it may be dissolved. To confirm this explanation, it is well known that this vapour is sometimes visible; and clothes acquire this smell in those privies only whose stench is peculiarly offensive; and wood, &c. exposed for some time, to such effluvia, acquire a dirty covering.

THERE

THERE is an observation, in the *humane* HOWARD'S state of prisons, that may be thought to argue against the doctrine here advanced. 'My clothes were,' he says, 'in my *first* journies, so offensive, that, in a post chaise, I could not bear the windows drawn up; and was therefore often obliged to travel on horseback. The leaves of my memorandum-book were often so tainted, that I could not use it till after spreading it an hour or two before the fire: and even my antidote a phial of vinegar, has, after using it in a few prisons, become intolerably disagreeable.' (q) In this case, I suspect that the air of the prison was *supersaturated* with noxious effluvia. He particularly distinguishes in italics the '*first*' journies. Tho' his benevolent remarks had happily effected reformation before his

(q) Howard's state of prisons. 2d ed. p. 8.

second visits, yet it cannot be supposed that such noxious effluvia were totally destroyed; but only that the quantity was so diminished as not to supersaturate the atmosphere. It might be difficult to determine this point by the test of transparency, as it is probable that not a single ray of cheerful sunshine ever did or could penetrate into those gloomy mansions.

IF this idea be well founded, it should suggest a caution to keep the chamber, where there are patients in the small-pox, well ventilated, in order to prevent the variolous miasms from communicating, by supersaturation, an infectious quality to clothes; and, fortunately, it is well known that fresh air is extremely salutary, and would be conducive to their recovery.

ON this subject, the scenting of clothes, &c. by the effluvia of musk obviously



viously suggests itself. The vapour of musk is uncommonly penetrating and permanent, in a manner difficult to be explained, and, I believe, different from any other effluvia. It seems to be an exception to the general analogy of nature, which produces infinite variety of odours that are not suspected to communicate any scent to clothes.

DR. LIND, in his excellent papers on fevers and infection, in a masterly and philosophical manner, has detected the contagious nature of various fevers not before suspected to have that pestilential quality. His remarks, if properly attended to, might be of great importance to mankind, especially to this nation, by preserving the lives of our brave sea-men. He has shewn that cleanliness and fresh air will not in all cases destroy this poison, that it is retained in the beams of wood, &c. of ships in the service, and in the decayed

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timbers

timbers of old hulks (p. 39, 42). But I apprehend that this observation is in no respect applicable to the variolous miasms, a poison *sui generis*, never known or suspected to be spontaneously generated since its original production. Whereas these pestilential fevers probably admit of generation by human effluvia, in close apartments, occasioned perhaps by some particular modification of the putrefactive process. In old hulks, the decayed timbers, and, in other ships, the beams of wood, in a decaying state, may naturally be suspected to exhale a poisonous vapour. The fumes of burning brimstone seem well adapted to check this kind of putrefaction. But we know too little of the nature of the variolous poison to investigate its antidote :----unless, perhaps, in a certain sense, it should appear, that *dilution* may be deemed a sufficient and practicable corrector of this poison.

ON the whole, it is difficult to imagine how miasms adhering to clothes should convey infection. The quantity of air impregnated with variolous miasms contained in the interstices of clothes is so extremely minute, and, by passing thro' fresh air, would be so quickly diminished, that a sufficient quantity to do mischief cannot be reasonably supposed to remain at even a small distance from the infectious chamber. The only clothes that seem capable of conveying variolous miasms from one chamber to another are gloves or boots, if they be pulled off in air strongly impregnated with this poison, and so stiff as not to collapse, and a person liable to the small-pox should purposely inspire all the air they contain. The hollow furniture of a patient's chamber, as, boxes, drawers, &c. are less suspected, but more dangerous means than clothes, of conveying infection.



fection. They contain a considerable quantity of air impregnated with various miasms, which, if shut up, might long remain there.

ANOTHER less obvious means of communicating infection seems not improbable. If a bottle, full of any fluid, be emptied in the small pox chamber, especially near the patient, as often happens, it would be immediately filled with infectious air, that might retain its poisonous quality at any distance of time or place, as, in that situation, it seems unlikely that any fermentation could change this quality. But the infectious air might easily and certainly be removed by filling the bottle again with any liquid.---However, I confess, that these are merely theoretical conjectures, which I cannot confirm by facts.

So much for theory and analogy.  
Let

Let us next inquire if it can be determined, by actual observation, whether variolous miasms adhering to clothes, &c. spread the small-pox. It has often been observed that infection was caught from a person, who had visited a patient in the distemper. So many instances of this kind are mentioned, and on such good authority, that the fact cannot fairly be disputed. The common explanation of this mode of spreading the small-pox is to suppose that the variolous miasms adhering to clothes convey the infection. But, if this were the cause, the infection must be much more frequently communicated by visitors: because the clothes of *every* visitor, in an infectious chamber, must be exposed to the variolous miasms. On the contrary, we have innumerable proofs that clothes, &c. exposed to the miasms of a small-pox chamber, and soon after approaching persons liable to the distemper do not  
*always*

*always* nor *generally* communicate infection. Cases of this kind occur so very frequently, that it seems unnecessary to relate particular facts : I could, if required, produce numerous proofs to establish this point. Inoculators particularly have their clothes, &c. daily exposed to the variolous miasms, yet they do not convey the natural small-pox to others liable to it, tho' during the time of preparation they approach very near them, for days and weeks previous to inoculation. We know *certainly* that recent variolous matter conveyed near to a person capable of having the distemper is generally infectious : if it approach *three* within the infectious distance, it is probable that one of them will be attacked, in the proportion of several thousands to one, (see p. 27, 28). Now a person, who has been in the small-pox chamber, may inadvertently convey the variolous matter either adhering to  
his



his clothes, hands, feet, &c. These considerations shew, to a high degree of probability, that the small-pox is always conveyed out of one house into another, not by miasms adhering to clothes, but by variolous serum, pus or scabs.-----A caution may hence be suggested to medical and other visitors, never to sit down in the chamber of a small-pox patient.

A physician justly celebrated for his professional knowledge, who honoured this Inquiry with a perusal in manuscript, makes the following remark, on this point, in answer to the 2<sup>d</sup> Query annexed to the INQUIRY. ‘ Do the rules of prevention comprehend every necessary restriction ?’

‘ A. to Qu. 2. If the theory be true that contagion cannot be carried out of an infected house by variolous *effluvia* absorbed in clothes, &c. of

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‘ medical

‘ medical attendants, &c. no necessary  
‘ restriction seems to be omitted. But  
‘ I know many, whom no arguments  
‘ will convince, that the small-pox was  
‘ not brought into their families by  
‘ surgeons, apothecaries, &c.’

To this objection, I reply, that medical attendants, it is well known, carry variolous matter in their pockets for the purpose of inoculation, sometimes perhaps not sufficiently closed from the external air; and it may also, now and then, accidentally stick to their clothes, hands, feet, &c.

It is of much greater importance than it may seem, to a superficial observer, to ascertain whether the variolous miasms are absorbed by clothes, &c. so as to become infectious. If this were the case, no person could possibly go into an infected chamber, either on duty or by accident, but his clothes and every

every thing around him would inevitably be rendered pestilential. Nothing less than a total separation of patients in the small-pox, and all their attendants, from those who are liable to the distemper, would be a sufficient security from infection. To effect this, regulations would be required that are absolutely impracticable in this free country. It may be imagined that a pest house would answer the purpose. It has in fact been successfully used for this end in remote small towns, where the small-pox rarely occurs, where it infects but a few, and those generally grown persons. But in large towns, where the distemper is constantly present, almost all the poor natives are infected while children. If an infant be attacked, and carried to the pest house, the feelings of a mother would not suffer it to go alone, even in the most arbitrary government. If she have other small children, they would perish at home without her assistance, and



must therefore go into the pest house along with her. Unsurmountable embarrassment would arise, if we suppose only *ten* such families to be admitted at the same time.

LET us farther consider some of the innumerable difficulties of preventing the propagation of the small-pox, if clothes exposed to the variolous miasms were rendered infectious. The *whole* external surface of the clothes and person of *every* visitor, must be *always* contaminated, on returning out of the sick chamber, and would convey the distemper to all liable to it who soon approach them after such contamination. It is not pretended that this pestilential quality can be discerned by any of our senses. The miasms adhering to clothes cannot be seen nor even smelt, that I ever heard of. No practicable restrictions could possibly be devised, much less executed, to prevent such secret, subtile,

subtile, and unsuspecting danger. Under a general conviction of these supposed difficulties, the point is given up in despair. No attempt is made to destroy the poison. It is allowed to be carelessly scattered among mankind, tho' the well-known cause of a mortal malady ; because, according to the opinion which has long and universally prevailed, other means, utterly beyond our power to prevent, are equally capable of producing the mischief.

BUT I argue; that the variolous poison in the form of serum, pus and scab, by impregnating the air near it, is the sole means of infection. If this opinion be well founded, the difficulty of prevention, is less, than on the former supposition, beyond all comparison. The poison, in this form, may be seen and easily destroyed. One visitor in 10, or 20 may possibly convey out of an infectious room, some of the variolous matter

ter capable of doing mischief. It may accidentally adhere to some *part* of his clothes or person. But cleanliness alone, which the instinct of nature suggests, and social habits improve, would be fully sufficient to prevent the communication of infection, except by personal intercourse with the patient. If this conclusion be admitted, may not the variolous poison be prevented from injuring mankind, with as much ease and certainty as arsenic, laurel, or any other poison.

### § viij.

*The air is rendered infectious, but to a little distance from the variolous poison.*

WHEN the small-pox becomes epidemical at any season, it is thought by many to *infect the air of the place*, to a considerable distance (*r*). And as this

(*r*) See the Introduction, p. 5, 6.



quality of the air is supposed to be far above human power, or wisdom either to avoid or correct, the danger is acquiesced in as inevitable. This opinion merits attentive consideration, as, I apprehend, it suggests fear where there is perfect safety, and prevents caution where there is the greatest danger.

I WILL state the *train* of argument, which first suggested doubts concerning the truth of this opinion, and afterwards the *facts*, which seem to prove that the opinion is utterly false.

IN the chamber of a patient who has the malignant small-pox, it is well known that the variolous miasms occasion a most offensive smell, and to a much greater degree *near the patient*, than at a distance, even in the same room; tho', as far as I have observed, the miasms are invisible where the air is most saturated. This fact seems to  
prove,

prove, that the whole air contained in the chamber of a patient is seldom or never saturated, with the variolous poison, much less supersaturated. Consequently, when the infectious miasms, dissolved in a certain portion of air, are *diluted* with fresh air, the strength of the poison is inversely as the quantity of air. The infectious air that issues out of a chamber, which contains a small-pox patient, by the doors, windows, and crevices, is a small quantity compared with what is contained in the chamber, and least saturated with the poison. But suppose the infected air contained in a *whole chamber* were to be mixt with the external air, *dilution* would probably soon render it harmless. The poison would be diluted with several hundred times more air, at the distance of a few yards, than in the patient's room. Suppose a chamber to be 10 feet in each dimension, it would contain 1000 cubical feet of air. A body  
of

of air including the chamber and 45 feet on each side of it, would be 1,000,000 cubical feet. But, if the chamber be on the ground floor, near one half of the cube must be subtracted, there being, in that case, few or no feet of air in a perpendicular direction from the patient downwards; there will therefore remain above 500,000 cubical feet. Hence the degree of dilution will be more than 500 times greater, at the distance of 45 feet, than in the patient's chamber.

THE force of this reasoning will be best understood by reflecting, what a wonderful effect *dilution* produces upon the most virulent poisons. Thus, a single drop of caustic fixed alkali will corrode a hole in a person's clothes or skin; yet, when diluted with a small proportion of water, becomes a safe and wholesome remedy. There is an illustration still more apposite to the

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present subject. Fixed air breathed into the lungs is one of the most instantaneous and deadly poisons known : yet fixed air, diluted with a small proportion of atmospherical air, becomes not only safe, but, in some cases, salutary. These considerations seem to shew the improbability of the open air being infectious, even to a small distance from a sick chamber. In the same house, doors and passages may give a particular direction to the poison, so as to convey its influence to a greater distance. I know but one cause that can be likely to disperse the infection farther from the patient's chamber than as above estimated, that is, a strong wind. But, to have this effect, the wind should blow directly through the chamber, an uncommon circumstance ; and, even in that case, the miasms would, by agitation, be soon mixed with a large proportion of atmospherical air. In general, when  
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the wind blows from an infectious house, there is at most a door or a window open, and consequently not more than perhaps a tenth of the infectious air contained in the sick chamber, may be mixed with the surrounding atmosphere in an hour, during which time, a part of the poison would be blown to a great distance.

To diminish the force of this argument, it may be suggested, that the variolous infection is a ferment, which, by an admixture of a few of its particles with the blood, occasions the generation of a large quantity of poison. It cannot be denied, that, by inoculation, a very small portion of matter, and, we may even allow, that by natural infection, perhaps a much smaller quantity of miasms, dissolved in the air of a small-pox chamber, can produce, in some subjects, so much variolous poison as would communicate the

distemper to thousands. But when the infectious air is again diluted, several hundred times, with fresh air, we cannot suppose it to retain any mischievous energy. A fact respecting another kind of ferment, sets this point in a true light. A pint of yeast is sufficient to excite a fermentation in a barrel of ale, but 100th, much less 1000th part of this quantity of yeast, would not have the effect.

THESE *theoretical* considerations shew, to some degree of probability, that the infectious atmosphere has some limit, and not far remote from the variolous poison; but cannot determine, with any exactness, to what distance the infectious quality extends. However, they suggested the observation of the following facts, which approach nearer to an investigation of this important question.

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THE intelligent reader will remark that each fact here stated is a separate proof of the doctrine above advanced. The small-pox was epidemical in Chester from May, 1777, till January 1778, that is, for 9 months, particularly for the last 6; during which time I attentively marked its progress. 1. At the beginning two or three families were seized, not immediate neighbours, but in the same quarter of the town. 2. Then the children of a neighbourhood, comprehending an entry, had the distemper, but it did not spread from them as a centre. 3. In no part of the town it has spread uniformly from a centre, farther than thro' an entry or a narrow lane, where all the children of a neighbourhood play together. 4. Afterwards the poor children in several parts of the town were attacked, at a considerable distance, in some places half a mile, off each other. 5. Yet, many  
portions

portions of all the large streets were not infected in November, but so late as December and January, the distemper returned to attack many who had escaped, when it was in their neighbourhood some months before. 6. In Handbridge, a part of Chester, only separated from the rest of the town by the river Dee, not more than about 7 had been infected during the epidemic, tho' great numbers of children, in this quarter, are liable to the distemper. 7. In the middle of the city, in one street, (King's), of 24 who never had passed thro' the distemper, only *two*, both in the same house, were attacked. 8. During the summer and autumn of 1777, while this epidemic was general in Chester, many of the surrounding villages (as, Christleton, Barrow, Tarvin, &c.) and some larger towns (as, Nantwich, Neston, &c.) were visited by the small-pox in one or more families, yet the distemper did not spread generally thro'

thro' any of these towns. As both the state of the air, and the variolous poison were the same in these places as in Chester, why did it not equally *infect* their *air* as well as our's? 9. At Frodsham the small-pox began in May, and gradually became more frequent, so as to be remarkably epidemical in one part for several months, yet nearly one half of the town, Nov. 18th, 1777, still remained quite uninfected. On the contrary, at Upton, a small village two miles from Chester, of 24 children who had never been attacked by the distemper, all except one (who was also certainly exposed to the infection) had it in less than two months. The reason of its speedy propagation I shall give in the words of Mr. Edwards, surgeon, a very intelligent inhabitant of the place. ' The distemper has not been  
' propagated by the air, or contiguity  
' of houses, but has increased in pro-  
' portion to the communication which  
families



‘ families had with each other ; no care  
‘ was taken to prevent the spreading,  
‘ but, on the contrary, there seemed  
‘ to be a general wish that all the chil-  
‘ dren might have it.’ 10. It is uni-  
versally allowed that the variolous in-  
fection attacks the children of the poor  
people first, and by far the most gene-  
rally. But the air is equally breathed  
both by rich and poor, and, if infec-  
tious, would equally communicate the  
distemper to both, in proportion to their  
respective numbers. Many instances  
daily occur of a favourite child living  
in large towns, where the small-pox  
almost constantly rages, who, by an-  
xious care to avoid the distemper has  
escaped it, till arrived at maturity, and  
received the infection by inoculation,  
or by mixing with society in a less cau-  
tious manner. Of many gentlemen’s  
children liable to the distemper in Ches-  
ter, not one was seized by the natural  
small-pox, whose infection could not  
be

be accounted for, during the whole time of this epidemic.

II. THESE observations may be deemed too general to determine, with sufficient exactness, to what distance from the poison, the air is rendered pestilential. But, as the following fact will ascertain, with some precision, in certain circumstances, the limit where the variolous poison begins and ceases to be infectious, in the open air, I shall endeavour minutely to describe every particular that could be supposed to influence this effect. A gentleman's family, of whom eight were children, all liable to the small-pox, became inhabitants of Chester in November, 1777, having always till then lived in the country. On the 8th of that month, in the afternoon, the weather being showery, cloudy, but not windy, and of a moderate temperature for the season, the eldest, an intelligent young lady (Miss Archer,

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since married to Roger Comberbach, Esq.), from whom I had this information, and three of her brothers, went out, for the first time after their arrival, to view the town. Ascending the walls at the Northgate, they turned westward, and soon met a child of about a year old, in the small-pox. The pustules were pretty numerous on the face ; some appeared fresh and full of matter, others were scabbed. A nurse had the child on her left arm, passed on the north side, between them and the city wall, so that its face was toward the young lady and brothers. The clothes of neither nurse nor child seemed dirty. The breadth of the path is a yard and quarter, between the wall of a building on the south side two yards and an half high, and the city wall, on the north side, whose top is one yard and a quarter higher than the path, and six yards above the ground. The young Lady's face was  
nearly



nearly on a level with the child's ; her brothers were rather lower. She is certain that she passed within half a yard of the child, and doubts whether she was not within half that distance of it. Her brothers, she believes, were all as near it. The narrowness of the path between the two walls renders this opinion very probable. They all walked exactly, or nearly in the same line with the child, both before and after passing it. Both parties walked uniformly forward in opposite directions, at a moderate rate, except one of the brothers, who expressed a curiosity to look at the small-pox patient, stopt a little moment when opposite to it, and about a minute when some yards past each other. The young Lady is certain that he did not touch, but thinks that he approached nearer the child than herself or any of the rest. This brother was the only one of the party who was infected. He was seized with the eruptive fever

on the 15th of November, that is, on the 10th day after the interview; yet all the other *three* were susceptible of the distemper, being infected by him. They were attacked on the 1st, 2d and 3d of December; that is, on the 24th, 25th and 26th day after meeting the child; a longer period than has ever been supposed to precede the fever. Another brother was seized Nov. 29th, and another sister, Dec. 2d, who had not been on the walls. Tho' the *three* who met the small-pox patient, passed so near it, yet it is highly probable that none of them, and to a much greater degree, several thousands to one, (see § iv.) that all were not exposed to the infection. Few medical conclusions can be drawn with such a degree of probability:

As my informer cannot recollect the direction of the wind at this time, but believes that there was little or none, it may be imagined that the variolous  
miasms

miasms of the patient might be blown *from* the young party as they passed. But as they went on the south side of the patient, and as, on this side, the wall was  $2\frac{1}{2}$  yards high, it will clearly be conceived impossible, if the wind was southerly; if the wind blew from the south or the east, it must carry the miasms *towards* them before, or after passing; if it was northerly, they would receive the miasms as they passed the patient: if calm, they must breathe the air impregnated with miasms for a considerable way after passing the patient, in walking between two such walls. To some it may appear of importance, that the small-pox was particularly epidemical at this time in Chester, and chiefly in this part of the town; the greatest mortality from this distemper being in October, November and December. Besides, all the party were just removed from the fresh air of the country; a change supposed to render them



them particularly susceptible of infection. The patient seems to have been in the most infectious stage of the distemper, as appears from the above description. As all the *four* were nearly of the same age and had all their senses perfect, it appears that the *three* who escaped infection did not, but the 4th who was attacked did inspire a sufficient quantity of variolous miasms to produce the distemper, either by approaching nearer to the patient than the rest, or by remaining longer in the poisonous atmosphere. In this case, the limit where infection commenced and ceased seems very nearly determined. However, I am very far from thinking that any general conclusion can be deduced from this single fact. It appears reasonable to suppose, that the infection would have been communicated at a greater distance, in the following circumstances; namely, if the pustules had been more numerous, and of a more malignant

malignant kind; if the patient had been an adult; if the clothes of the nurse and child had been bedaubed with variolous matter; if both parties had remained in the same place, and the wind had blown moderately from the patient towards the persons liable to infection; and, perhaps, if the weather had been hotter and moister.

12. As the fact above related affords a good foundation to judge at how small a distance, in the open air, a small-pox patient exerts a pestilential influence, so the following, which I know to be exactly true, seems to prove this important point, that *the variolous poison, in a house, is not infectious to any person out of it*. While I was anxiously meditating on some practicable method of inoculating the poor citizens of Chester, I received intelligence that the natural distemper had just appeared in a family in Handbridge, a quarter of the town, where

where I knew that a great number of children were liable to infection. I went to the mother, Elizabeth Bryly, who was very poor, explained to her the *Rules of Prevention*, (see the annexed PROCEEDINGS, No. v.) which I wished to be observed, in order to prevent any of her neighbours from catching the distemper. They were left with her in writing; to conciliate her good opinion, I gave her a shilling, and promised ten more, if she punctually followed their direction. Tho' 'two  
' of her children were attacked by the  
' small-pox, and one of them died;  
' yet, except a boy who had been in  
' the sick chamber before the directions  
' were given, not a single child caught  
' the disease, altho' two were liable to  
' it even at the next door, and not  
' fewer than 26 in the near neighbour-  
' hood." (See the annexed PROCEED-  
INGS, No. vij.)-----Mr. Owens, in-  
specter to the Society, can witness that  
these facts are accurately stated.



THE girl who died, was for a fortnight, during the day, in the room to which the outer door immediately opens. The path runs as close as possible by the door, where the children constantly passed and often played. The door was frequently open, and sometimes, tho' rarely, a window without glass, on the side of the room opposite to the door. The atmosphere at this time was not incapable of impregnation with the variolous poison and communicating the infection, because the girl's brother and a neighbour's child, the only two that had been in the sick chamber, caught it. Yet we may conclude, that of the 26 children and perhaps many more, who passed for a fortnight close by the outer door, not *three* were exposed to the infection is probable to the degree of *several thousands to one* (see § iv.) Few situations could be devised more capable of spreading

P

ing

ing the infection. Two circumstances only seemed wanting to produce this effect in the greatest possible degree, that is, the patients were children, who do not generate so much infectious matter as adults, and the season was cold. But even these circumstances would be more than counterbalanced by removing the patients, or the persons liable to infection, to a little more distance from the outer door, by which means the varicellous impregnation would be so much *diluted* as to render it harmless. Hence we may fairly conclude, that this infection can very seldom, *if ever*, be propagated from the inside of a house, especially an inner chamber, to a person in the external air.

THE facts here faithfully related, particularly the two last, so fully confirmed the train of argument which had suggested these observations, as clearly to convince me that *the varicellous*

*lous poison did not render the surrounding air infectious to such a distance, as to frustrate all human attempts to stop its progress.*

13. As a farther illustration of this important point, I will relate the following fact, of which Mr. Skerratt, surgeon, of Malpas, was witness as well as myself. A son of Mr. Lea near Eméral, in Flintshire, was attacked by the small-pox, on January 1st, 1780, had the distemper very moderately, about 20 or 30 on the face, and in proportion on the rest of his body, and was removed out of the house on the 13th day of the disease for fear of infecting others in the family. The 2d was seized on the 19th, the 3d and 4th on the 23d of January. But the 5th, the mother, who was much afraid of infection, and probably more cautious than the rest, did not perceive the variolous fever till the 11th of February, that is,



till the 43d day after the 1st began, and the 30th after his removal. All the family endeavoured to avoid any intimate intercourse with the first patient, yet they all, particularly the mother, went every day into his chamber, which was a small one. However, it is manifest, that she was *not infected by approaching very near him. in a small chamber, even during maturation.*

IN the investigation of this subject, it is not only curious but important to inquire, in what part of a room there is the greatest danger of infection. A striking fact, concerning another infectious distemper, which we have received on the best authority, may illustrate, if not determine, this point. Sir John Pringle (*f*) informs us, that, at the sessions of the Old Baily, in 1750, the jail fever was communicated, from

(*f*) Obs. on the diseases of the army, p. 341.

the prisoners, to one part only of the court and jury, by a window at the other end of the room. ‘ The air from  
‘ the window directed the putrid steams  
‘ to that part of the court above men-  
‘ tioned.’ May we not hence conclude, that there is the greatest danger, where the infectious poison is placed between the person liable to infection and the open air ?

## § IX.

*Consequently, the small-pox may be prevented, by keeping persons, liable to the distemper, from approaching within the infectious distance of the variolous poison, till it can be destroyed.*

IF the small-pox be communicated by infection (§ i.) and by infection only, (§ ii.), if it be only caught by approaching very near to the variolous poison (§ viij.), in a recent state or that has  
been

been close shut up from the air ever since it was recent (§ vi.), and the variolous miasms do not render clothes, &c. infectious (§ vii.); it follows, that the small-pox may be prevented, by keeping persons, liable to the distemper, from approaching within the infectious distance of the variolous poison, till it can be destroyed.

THE variolous poison, if exposed to the air for a sufficient time, is probably deprived of its infectious quality, being dissolved in the atmosphere: I have known several instances (see p. 32---99) where the small-pox was communicated in the open air by two persons meeting and walking in opposite directions. These facts prove that an infectious quality is *quickly* given to the air, and consequently that it may *soon* be exhausted. When the variolous poison ceases to dissolve in the air, it ceases to produce the natural small-pox. However,



ever, it is not impossible, if a large quantity of variolous pus were collected together, that a part of the poison might be shut up by dryness on its surface, and become again infectious, on being moistened, at a considerable distance of time. The most certain method of purification is by washing. Water, is well known to be the universal cleanser of clothes, &c. from animal filth. Our senses can distinguish when a very small quantity of variolous matter adheres to clothes, &c. and if a few poisonous particles should remain, after washing, the air would probably soon dissolve them.

THE *epidemical* small-pox, which has been attributed to a peculiar constitution of the atmosphere, by the sagacious Sydenham, and by most other physicians who have since written on this subject, may be supposed incompatible with this conclusion, but I think it can be explained

explained in a satisfactory manner, on the principles of this inquiry.

BUT as particular facts convey more certain conviction than general observations, I request the reader to consider the following table. The 1st and 2d columns are quoted on the authority of my very ingenious friends Dr. Percival and Mr. Aikin.

Deaths by the small-pox, in 1781.

	<i>Manchester.</i>	<i>Warrington.</i>	<i>Chester.</i>
January	- 3	- 7	- 1
February	- 5	- 8	- 0
March	- 10	- 5	- 0
April	- - 17	- 5	- 1
May	- - 31	- 5	- 0
June	- - 44	- 6	- 0
July	- - 55	- 3	- 0
August	- 46	- 4	- 1
September	- 53	- 3	- 0
October	- 36	- 0	- 2
November	- 31	- 2	- 1
December	- 13	- 2	- 1
	<hr/> 344	<hr/> 50	<hr/> 7

IN

IN January, 1781, the small-pox was brought from Dublin to Parkgate, where it was not propagated to a second family. In the same January, it was brought from Liverpool to Neston, where it continued to spread for several months. Yet Parkgate and Neston are two towns, or rather two parts of the same town, not a single mile distant from each other. I relate this fact on the best authority, Mr. Wolstenholme's, surgeon, of Neston.

HENCE we see, on surveying several large neighbouring towns, as Manchester, Warrington and Chester, that the distemper is very seldom absent from any of them, but that it becomes generally epidemical at uncertain periods in each, and at times which hold no correspondence with one another. In like manner, on comparing several neighbouring villages, we observe, some  
Q entirely



entirely free from the distemper, others have a few only infected, others suffer a general seizure.---The observation is generally true in regard to this part of Great-Britain; but it will be thought sufficient to have produced a particular instance.

WHOEVER considers the numerous facts here faithfully related, will perhaps be convinced, that the distemper becomes epidemical, neither thro' any peculiar state of the air, nor of the human constitution. No such difference can reasonably be supposed to exist in large towns within 20 miles of each other, much less in neighbouring villages, and least of all in different parts of the same town or village. If what is above advanced be true, the seeming mystery may be explained in a few words. *The small-pox continues spreading as long as persons liable to the infection approach patients in the distemper or infectious*

ous matter, either in the same chamber or very nearly in the open air, and then ceases. When it has attacked none, or but a few in any place for some years, a large number of the young generation becomes liable to infection; if therefore it be introduced in these circumstances, many of them nearly approach the infectious, become themselves infectious, and propagate it to others, so that the distemper seizes all capable of having it, except a few who are kept from a free intercourse with the rest; this is called the *epidemical* small-pox. In other places, the distemper does not spread from a small-pox patient, none liable to infection approaching within the infectious distance, either because it has lately been epidemical, so that nearly all have had it, or because the patient is kept separate from the rest, through his own prudence or their fears. When only one or two families are infected by the small-pox in any

town or village, no one will dispute it is *possible*, that no person liable to the distemper may come within the infectious distance of the poison, before it be destroyed by washing or other methods of cleanliness. If this be done by accident or design, I maintain that the distemper will spread no farther. On the contrary, no one acquainted with the present habits of carelessness in regard to this poison, and how generally it is dispersed in clothes, furniture, and food, will doubt that some of it, while fresh, may come within the infectious distance of some persons liable to the distemper, and, in consequence, that these will be attacked. The more patients are infected the more poison will be generated, and, if many in the place are susceptible of infection, the more quickly and generally it will spread. May not this view of the matter entirely explain the difference between the *sporadic* and *epidemic* small-pox



pox, so often mentioned by medical authors ?

II. I have hitherto considered ‘ *how*  
“ *the small-pox may be prevented,*’ merely  
as a medical question. If the conclu-  
sion I have ventured to deduce, be true,  
we may next inquire, whether and in  
what manner it might be capable of a  
practicable application, either by civil  
regulations, or by a private society,  
founded on principles of charity, and  
benevolence to mankind. What ade-  
quate method can be devised to coun-  
teract and correct the prejudices and  
habits that have long and generally  
pervaded society ? The precept, “ *de-*  
“ *stroy the variolous poison,*” is short and  
full. But as a popular regulation the  
directions ought to be more explicit.  
Do the following comprehend all ne-  
cessary restrictions ?

*Mankind*

*“ Mankind are not necessarily subject to the small-pox ; it is always caught by infection from a patient in the distemper, or the poisonous matter, or scabs, that come from a patient, and may be avoided by observing these*

#### RULES OF PREVENTION.

*“ I. SUFFER no person, who has not had the small-pox, to come into the infectious house. No visitor, who has any communication with persons liable to the distemper, should touch or sit down on any thing infectious.*

*“ II. No patient, after the pocks have appeared, must be suffered to go into the street, or other frequented place.*

*“ III. THE utmost attention to cleanliness is absolutely necessary : during and after the distemper, no person, clothes, food,*

food, furniture, dog, cat, money, medicines, or any other thing that is known or suspected to be bedaubed with matter, spittle, or other infectious discharges of the patient, should go out of the house till they be washed ; and till they have been sufficiently exposed to the fresh air. No foul linen, or any thing else that can retain the poison, should be folded up and put into drawers, boxes, or be otherwise shut up from the air, but immediately thrown into water and kept there till washed. No attendants should touch what is to go into another family, till their hands are washed. When a patient dies of the small-pox, particular care should be taken that nothing infectious be taken out of the house so as to do mischief.

“ IV. THE patient must not be allowed to approach any person liable to the distemper, till every scab is dropt off, till all the clothes, furniture, food, and  
all



all other things touched by the patient during the distemper, till the floor of the sick chamber, and till his hair, face, and hands, have been carefully washed. After every thing has been made perfectly clean, the doors, windows, drawers, boxes, and all other places that can retain infectious air should be kept open till it be cleared out of the house."

THO' the observance of these rules requires little trouble and no expence, yet every restriction is attended with some inconvenience, especially to the poor; as a recompence and motive of obedience, some reward should be given and probably their attention may be best secured by annexing to the rules a

#### " PROMISSORY NOTE.

DATED,

" *The SOCIETY for promoting general inoculation, at stated periods, and for preventing the natural SMALL-POX in Chester, promise to pay* *£1000* *to the*

the sum of [half a crown or a crown,  
or           ] as soon as all the scabs are  
dropt off the patients in           family,  
on condition that the said           and

family exactly observe the fore-  
going rules ; and allow any member of  
the society, or their inspector, to in-  
quire whether they are exactly observ-  
ed. And as a farther encouragement  
to follow these directions attentively  
and faithfully, the society promise [dou-  
ble or           ] the reward, if no neigh-  
bour or acquaintance be attacked by  
the small-pox, during the time it is in  
the family of the said           nor  
within 16 days after all the scabs have  
entirely fallen off the family.

“ By order of the Society,

Inspector.”

To the inhabitants who are placed  
above want, it would be highly impro-  
per to offer a pecuniary motive : it may  
be sufficient to annex to the rules the  
following request.

R

*The*

*“ The independent citizens, to whom the rewards of the Society will not be worth acceptance, are earnestly requested to observe the regulations, through motives of humanity, in order to preserve their fellow-creatures from so fatal a pestilence as the natural small-pox ; and to permit the inspector, if they have no other medical visitor, to see that they are observed, lest their servants inadvertently spread the contagion.”*

IN order to ascertain with what degree of accuracy and fidelity the rules of prevention are observed, it will be necessary to appoint an INSPECTOR. His office would be to obtain information as early as possible, after the small-pox had appeared in a family ; to give them the *gratis* rules or the *promissory* notes ; to visit them frequently ; and to keep an exact REGISTER, on a plan that may include every necessary information, that can be required to investigate the progress of the distemper thro’ a town.

Register



AN actual and not an imaginary example of a register is here given. To explain the utility of the intelligence contained in the different columns of the register, I will anticipate from the PROCEEDINGS of the small-pox society at Chester, the following CERTIFICATE of their Inspector.

“ GENERAL MEETING of the SMALL-POX SOCIETY, Nov. 4, 1778.

“ **I** ROBERT OWENS, Surgeon and Apothecary, being the *Inspector* appointed by the *Society for promoting General Inoculation at stated periods and for preventing the natural small-pox in Chester*, do certify, that each of the following persons has received, of the said Society, the reward of TEN SHILLINGS, for observing their rules to prevent the small-pox from spreading; the numbers here marked referring to the place in their register of the distemper.

R 2

I Eliz-

- “ 1 Elizabeth Bryly, Sty-lane.  
 3 Anne Collier, Northgate-street.  
 4 Hannah Coleclough, Bridge-street.  
 7 Elizabeth Ashton, Northgate-street.  
 8 Hannah Price, Gorfe-stacks.  
 10 Anne Conolly, Bars.  
 11 Catherine Jones, Bars.  
 15 Mary Morris, Forest-street.  
 16 Anne Downing, Bars.  
 17 Anne Smith, Bunce-lane.  
 18 Elizabeth Tilston, Queen-street.  
 19 Elizabeth Johnson, Gorfe-stacks.

“ And I also certify that the Thanks of the society have been given to

5 Mr. Smith, Watch-maker.

13 Mr. Jenkins, Tanner.

For observing their rules, tho’ they would not accept any pecuniary reward.

“ I believe that one, and perhaps another, of the above families did communicate the small-pox to *one* other; but

I can

I can certify that none of the remaining *twelve* families has communicated the distemper to a single person in Chester, tho' one or more children, liable to the small-pox, inhabited the next adjoining house in *five* instances (1, 3, 7, 13, 16) and tho' *many* were capable of infection in the near neighbourhood in *ten* instances (1, 3, 7, 8, 10, 11, 13, 16, 18, 19) who, with many others, would, I am convinced, have caught the distemper, if not prevented by the regulations of the society.---I also certify, that, since the society has been established, only *seven* persons (including the two above mentioned) have communicated the distemper to another family; of whom I know that *five* transgressed the rules, and believe that the other *two* also transgressed them: That the person who did the most mischief, did it inadvertently; having communicated the distemper to many before,  
but



but to none after, being acquainted with the rules.

“ I farther certify, that the distemper has been stopped in *ten* different parts of the city ; and that, as far as I can learn from minute inquiries, there are only three small-pox patients in Chester. These effects I believe to have been principally produced by the *Rules* and the *Rewards* of the society.

R. OWENS, *Inspector.*”

As an illustration of the register, the inspector ought to write down as a comment on the vijth column what may be denominated *proofs of infection*. According to the doctrine which I have attempted to establish in the INQUIRY, these proofs may be comprehended in the following questions.

1. Did any person, dog, cat, clothes, food, furniture, money, or other thing  
out

out of an infectious house come near the patient from the 6th to the 16th day before the small-pox fever began?

2. Is there any evidence that the variolous poison did actually approach the patient during the period above specified?

THE latter would be a *positive*, the former a *presumptive proof* how infection was communicated.

IN the *seven* instances mentioned in the certificate, where infection was given to another family, it will be proper to state the degree of proof which can be produced in what manner the poison was conveyed.

1. THE 2d family was obliged to change their habitation during the distemper. One of their children with the small-pox upon her, *ran against* a  
child

child of the 4th family, who probably carried home some of the poison on her clothes.

2. THE 6th family were obliged to return to Liverpool in the distemper. They had the *single* reward a day or two before their departure, for having so long observed the rules. When they had received the reward, the children were allowed, contrary to promise, to play about the street, and probably transgressed other rules, so as to communicate the distemper to their next neighbour, the 7th family.

3. THE Inspector had no intelligence of the 9th family till the 14th day of eruption. Previous to this time, none of the rules were observed, and some, if not all, the children who caught the infection in this neighbourhood, had been in the infectious house. The *dates* of the register prove that the 9th family  
com-



communicated the small-pox before (yet only a little time before) being acquainted with the rules, to *four* families (10th, 11th, 12th, 13th,) but to none afterwards. This example shews the great probability that the distemper would have spread quickly, if it had not been prevented by the regulations of the society.

4. A child of the 13th family, with the small-pox upon him, was playing in a street window: he gave a *T totum* thro' the fash to a boy (in the 15th family) unknown to the parents of either.

5. Two cloths that had been made foul by two children who died of the small-pox in the 12th family, were sent, in that state, to the 17th family, in order to be washed, to a distant part of the town, near a mile off.

6. IT is doubtful from whom the 14th family caught the distemper. None nearer than the tenth house had the small-pox ; and in the intermediate space three children liable to it remained uninfected:

7. THE 14th was next house to the 16th. The nearest neighbour is most liable to transgress all the Rules. To be merely in the next house is not sufficient to communicate the distemper, as appears by *ten* separate proofs specified in the certificate and register. Whoever reflects on the whole train of evidence, will easily believe that in this and the last case there was some unobserved transgression of the rules.

IN confirmation of the Inspector's testimony, I can add my own, in most of these cases.

ANOTHER

ANOTHER circumstance merits attention. In 4 instances (4. 7. 17. 20.), it is noted in the register, that the 2d child caught the distemper from the first in the same family; this point is clearly proved by the dates when the pustules appeared. The observation was farther confirmed by subsequent facts: of the 37 cases comprised in the table, p. 42, all except three appear to have been infected by the patient who was first attacked in the house. These facts shew upon what a *casual* circumstance the infection depended. The poor children of the same family are almost constantly together, and very seldom in separate apartments. Hence we may conclude that the *whole* air of the chamber in which they lived was not rendered infectious, at the time when the first was infected.



THE summer was remarkably hot, and, for three weeks, very wet.

To give the facts stated in the register and the certificate their due weight, it is proper to compare them with the following. During this season the small-pox was epidemical in several neighbouring villages. At Christleton, a small village, two miles distant from Chester, the distemper began in March, and continued there till October. At the commencement of the epidemic, 107 poor children had never been exposed to the variolous infection; of these, 100 had the distemper, probably all who were capable of receiving the small-pox.

AFTER this short explanation, may not the following conclusions be reasonably deduced from the facts contained in the register and certificate?  
1. That they afford no proof that a  
patient

patient in the small-pox renders the air of an adjoining house, or the external air infectious, even when aided by heat and moisture. 2. That it does not appear from these facts that the variolous miasms render clothes, furniture, &c. infectious. 3. That the ‘*Rules of prevention*’ do not seem to have been insufficient for their purpose in a single instance.

It is highly probable that experience will discover some defects in the regulations : however it may be reasonably hoped that such defects will admit of a practicable correction. These conclusions are deduced from well-authenticated facts ; yet I am aware that they will only convince such readers as discern the truth of the theoretical principles above advanced. But if these principles be true, our establishment at Chester is likely to supply observations sufficient to persuade the most sceptical.

I could

I could adduce many facts from other infectious distempers, in favour of the doctrine maintained in this INQUIRY, but suppose that argument from analogy will be deemed superfluous, after so many direct proofs have been produced.



## Q U E R I E S.

1. Do the *rules of prevention* contain no unnecessary restriction?

2. Do they comprehend every necessary restriction?

3. DID you ever know *three* or more persons at the same time and place, all escape the small-pox, after being certainly exposed, for the first time, to the variolous infection, either by inoculation with genuine fresh matter, or by breathing the air of a chamber in which a variolous smell was perceptible?

4: DID you ever know the small-pox conveyed out of one chamber into another, by a person who certainly did not  
carry

carry any variolous serum, pus or scab on their clothes, hands, feet, &c.

5. ON the contrary, have you not known numerous instances of persons and clothes exposed to the miasms of a small-pox chamber, that soon after approached many liable to the distemper, who were yet not infected?

# A P P E N D I X

TO THE

## I N Q U I R Y.

**I**N autumn, 1778, the preceding INQUIRY was submitted to the consideration of my judicious friends, the late Dr. Fothergill, and Dr. Waterhouse. At that time, I did not know, that the small-pox had been excluded from any civilized country in the world : and was not a little rejoiced to learn from Dr. Waterhouse, that, what I conjectured to be practicable, had been actually accomplished, for a long series of years, in Rhode-  
T Island.



Island. The annexed account was written in answer to some queries I had proposed. It is so clear and satisfactory as to require no comment.

A LETTER FROM DR. BENJAMIN  
WATERHOUSE.

“ Lea-hall, 25th Sept. 1778.

“ I HAVE not forgot the promise I made to Doctor Haygarth when we were last conversing upon the small-pox, of sending to him an account of the means used in my native island which so effectually secures us from the rage of that dreadful disease. As it is upwards of three years since I left America, it is possible I may have forgot some of the circumstances, but I believe I retain the most material.---- It will be necessary to say something of the situation of Rhode-Island, and the connection of its inhabitants with other parts.

RHODE-

RHODE-ISLAND is 14 miles long and 7 broad; about 6 miles from the continent on the west side; scarce half a mile on the east, and open to the sea on the south. This island is the thoroughfare for all travellers from Connecticut, New-York, Jerseys, Pennsylvania, and all the southern provinces. On the shore of the continent opposite the east side, stand the towns of Bristol, Warren, Tiverton and some others, none of them containing less than a thousand inhabitants, some of them three times the number. Over this ferry come almost all the market people. To these add the great number of people who come by the great road from Boston and parts adjacent to Providence; from which place boats are constantly carrying passengers to the capitol *Newport*. This town contains about eleven thousand inhabitants; it is advantageously situated and esteemed

very healthy, infomuch that it is resorted to every summer by great numbers on account of their health from the West-Indies and the southern provinces.

“ THE measles, the chincough and ulcerated sore throat have been several times epidemic. But I do not recollect that any of these distempers were frequent among us, without seizing, nearly at the same time, the inhabitants of the neighbouring provinces.

“ NEWPORT is a very considerable sea port; their ships visit almost all the ports of Europe, the coast of Africa, the French, Spanish, Dutch and Portuguese settlements in the West-Indies. Ships from these parts do not so frequently bring the small-pox as from the ports nearer to us.

As



“ As inoculation is discouraged both in Boston and Rhode-Island governments, those who wish to be inoculated go to some of the southern provinces, where it is tolerated. Different places in Pennsylvania, New-York, and the Jerseys, are annually resorted to, by great numbers of the New-England people. Long-Island was a favourite spot with many. I have known the young people of half a dozen families set out together for these inoculating places, and return to their homes together, and yet we have so conducted matters as to prevent this dreadful disease from spreading among us \* ; which is done by observing the following rules.

“ Never to bring back any of their clothes worn during their stay at

\* See the INQUIRY, p. 16, where this fact is farther authenticated.

the inoculating place. Never to quit it till a certain space of time fixed by the inoculators, be the disease ever so slight. And, if they have any fores about them, when they arrive in the harbour, not to come on shore till they are examined by the inspector appointed for that purpose.

“ WHEN any person in the town is suspected of having the small-pox, they send for the inspector. If he thinks it is probable the person is infected, he takes with him some of the *overseers of the small-pox*, and if they, in conjunction with a practitioner, pronounce it the small-pox, the family has little more to do with the patient, who is, from that time to the conclusion of the disease, wholly under the direction of these officers, who remove him to an island where every thing convenient is already provided. This island is called *Coaster's Harbour* :  
it

it is a mile and a half in length, and about a mile in breadth : It is pleasant and sheltered by the continent from the north and east winds, is about half a mile from Rhode-Island shore, which shore is between two and three miles from the town.

“ FORMERLY, they carried the sick person in a box, in form of a large chest, big enough to contain a small bed. The cover was perforated with holes sufficient to give the patient air. The box was put on an easy sledge and drawn by a horse, attended by the *overseers* to the shore, when the box and sledge together were put into a boat, and in a few minutes the patient was in his hospital. When the inhabitants found that this formidable apparatus did more mischief, especially to timorous minds, than the disease itself, they dropt the use of the box, and substituted a sedan chair.

“ IT



“ IT has happened more than once that the disease was so far advanced, before it was known to be the small-pox, that the patient could not be removed without the utmost hazard. In that case, they boarded up the street, advertized it in the News-paper, and placed guards to prevent any person from coming within a certain distance of the house.

“ WHEN a vessel arrives in the harbour, with the small-pox on board, after the sick are taken to Coaster's Harbour, she is obliged to perform quarantine, and to hoist a jack in her shrouds, in which case no boats will board her: But, in common, commerce suffers no restrictions on account of this distemper.

“ I acknowledge some of these rules are unnecessary and inconvenient, but  
the

the dread of this disorder induces the people to adhere to them with cheerfulness. A stranger would be ready to conclude that they could not be so scrupulously complied with, without exerting an authority disagreeable to the people. But it is not the case. For the united voice of the people coinciding with the magistrate gives every regulation its wished-for effect; so that it rather appears like a popular custom than the restraints of law.

“ THE *Overseers* are generally persons of consequence, are very punctual in the duties of their office, and are intitled by law to something for their trouble.

“ If there is any thing else Dr. Haygarth wishes to know, and I can inform him of, he has only to direct a few lines to me, at Dr. Fothergill's,

U

and

and it will be communicated to him  
with the greatest cheerfulness, by his  
Friend,

B. WATERHOUSE."



P R O C E E D I N G S

O F A

S O C I E T Y

F O R P R O M O T I N G

I N O C U L A T I O N,

A N D P R E V E N T I N G T H E

N A T U R A L S M A L L - P O X

I N

C H E S T E R.



P R O C E E D I N G S

O F A

S O C I E T Y

For promoting INOCULATION, and  
preventing the Natural SMALL-POX  
in CHESTER.

No. I.

A D V E R T I S E M E N T.

March 13, 1778.

**T**HE havock made on mankind, by that  
dreadful disease the natural small-pox,  
cannot but excite the pity of every benevo-  
lent mind. From accurate registers it ap-  
pears that 378 persons have died of this  
distemper in Chester during the last six years,  
and that the deaths proceeding from this,  
compared with those from all other causes  
united,



united, have been considerably more than as 1 to 6. It is chiefly destructive to the poor, who are not only destitute of the assistance that medicines would afford, but of all the comforts, and many of the necessaries, that a sick family demands. Already oppressed with the various evils of poverty, their misery is augmented to the highest degree of wretchedness by this loathsome malady, which, after many bitter sufferings, bereaves them of their children unseen and unlamented.

SEVERAL of the magistrates, and other respectable inhabitants of this place, being thoroughly apprized of these circumstances, are desirous that a view of the melancholy scenes should be more fully exhibited to the public; in a well founded confidence, that the humanity and generosity of the citizens of Chester would be exerted to provide every possible relief. They request, therefore, that a public meeting of the inhabitants may be held at the Pentice, on Monday the 16th of March, at eleven o'clock in the morning, for the purpose of inquiring into the degree of this calamity, and of considering whether *many lives* might not annually be saved by  
the

the establishment of a Society for promoting general Inoculation at stated periods, and for preventing the natural small-pox. And, to obviate any groundless apprehensions that this proposal might excite, they think it proper to declare, that this design will not be attempted, unless it shall appear (as they trust it evidently will) that it can be executed upon a plan which cannot give any reasonable alarm on account of those who have never had the disease.

As the utility of such an Institution will be in exact proportion to the degree of approbation with which it is received, it is earnestly requested that all who are touched with pity for their fellow citizens in such complicated distress, will communicate their sentiments fully and freely, either by themselves or their friends, at the public meeting.

## No. II.

AT a public meeting of the inhabitants of Chester, held at the Pentice on the 16th of March, 1778, to inquire in what degree the natural small-pox had been fatal to our fellow

low citizens, it was proved by the *certificates* of the *Clergymen* of each parish, that during the last six years 378 persons had died of this distemper, that the whole number of burials, during the same period, was 2522, and of births 2706.

As there is reason to believe, that the weight of this calamity chiefly falls upon the poor, and greatly aggravates their complicated wretchedness, it was resolved, to send the following PROPOSAL to our humane and beneficent fellow citizens, recommending to their attentive consideration, whether the intended Society would not probably *relieve much misery and save many lives.*

It was also resolved, that another public meeting should be held at the Pentice on Monday, March 30, at eleven o'clock in the morning, to deliberate on the objections and improvements that may be made to the plan, and finally to determine whether it shall be carried into execution. At this meeting, all who are desirous of promoting the establishment, are requested to declare their intention, and to specify the sum they will give either



as a *benefaction* or as an *annual subscription*. The *moderate* contributions of *many* would fix the Society on the firmest foundation. If the design merit approbation, there will never be wanting, in this place, a sufficient fund to supply every necessary expence. On some occasions secret acts of charity are deemed most laudable, but in order to accomplish the benevolent purpose of this institution, the names of the contributors are particularly desired, as they will be requested to exert their farther kind offices of recommending patients, and explaining to their ignorant, or inattentive neighbours, the humane intention of the Society.

THO. FALCONER, Chairman.

It is proper to declare, that general Inoculation is not intended to take place at the present season, but at such other time as will be most agreeable to the inhabitants in general.

## No. III.

*A PROPOSAL to establish, in CHESTER, A SOCIETY for promoting general Inoculation at stated periods, and for preventing the natural Small-pox.*

IT has been proved by the *most authentic evidence*, that during the last six years the small-pox has been fatal to 378 persons in Chester, and, that during the same period, all the births have amounted to 2706. Inoculation, since its late improvements, according to the most unfavourable computation, is not fatal to *one* in 100 ; consequently, if the whole number had been inoculated, only 27 would have died, and therefore 351 lives would have been saved by this art, that have perished by the natural small-pox, or above 58 annually. If we should allow, in a general inoculation, even *twice* as great a fatality as above stated, on account of the less exact attention of the poor in observing directions, and other causes, yet still it evidently appears, that not less than *fifty-four* deaths would have been annually prevented ;—an important number, especially when we reflect that they are all  
cut

cut off in early youth, very few of them (only 1 native and three emigrants in 6 years) having attained ten years of age. By no other means can human power or skill so greatly diminish the present mortality of mankind.

[\* NEXT to the probability of such a measure being useful, it is important to shew the improbability of its being hurtful to this city. Some persons are incapable of infection by the small-pox. The proportion of mankind thus exempted has been observed to amount to 1 in 20. By a general survey of Chester, taken after the epidemical small-pox of 1774, it appeared, that all the inhabitants had actually passed thro' the distemper, except 1 in 14. (See the Philosophical Transactions for 1778). The average number of births is 397, which, divided by 20, will nearly give 20, the number naturally incapable of infection; the births divided by 14 will nearly give 28, the number at present annually exempted, in Chester. Hence it clearly follows

\* The argument contained in the crochets was written for, but not printed in the original PROPOSAL.

† See the INQUIRY, p. 25.



that all liable to infection are actually infected, except, perhaps, 8 annually : if these were also attacked, it would make less than two more deaths annually by this distemper. Consequently, if 9 were inoculated annually, by such an establishment, the advantage would fully compensate all the possible mischief, even if such a measure were to infect all capable of infection, a very improbable consequence. Besides, many who were uninfected with the distemper at the time of enumeration, have undoubtedly been since attacked, so that it appears that the small-pox does nearly the *greatest possible injury* to the inhabitants of Chester.]

A Hospital could never render inoculation general in this place. The age of admission into such a hospital is at seven years old. In the epidemic of 1777, out of 136 who died of it, only seven were arrived at that age, of whom only three were natives, and four emigrants. But if nurses were provided to attend younger children, yet only a few of the most indigent and least affectionate parents would allow their tender infants to be taken out of their own bosom, and inoculated in a hospital.

hospital. This is an insuperable objection, not to mention the great expence of building and maintaining so large a hospital as would be required for this purpose.

BUT if all the patients be inoculated at home, the expence will be extremely moderate, and the above-mentioned difficulty entirely removed. No objection to this method can arise from the danger of propagating the infection; because, if the inoculation be general, no subjects liable to infection would remain. But should age, indisposition, or prejudice occasion a few exceptions, yet even these will run incomparably less risk of infection from a general than a partial inoculation. For it will be performed only once in two years or perhaps seldomer, at a fixed time that will be *publicly* known; so that those who never had the disease may easily avoid all intercourse with the infectious. At any rate, they will be in much less hazard than at present from inoculation, which is performed at *various* times *every* year, and sometimes *secretly*. Not to mention, that it would prevent in a great measure, the imminent danger of being infected by patients in all stages  
of

of the natural small-pox that we daily behold in the streets, even in the crowded markets and fairs. If the purpose of the institution can be fully accomplished in banishing the natural small-pox from the place, this circumstance will afford the greatest comfort, and most pleasing security to those who are liable to the disease. At present this destructive pestilence is seldom or never absent: During the last seven years, and probably a much longer period, a single year has not elapsed without a fatal proof of its presence in this city, as appears from the register of mortal diseases.

It is necessary, but painful, to remark, that the present mode of partial inoculation, though highly beneficial to individuals, is, on the whole, pernicious to the community. Not more than twenty, or fifteen, or perhaps still fewer, are here annually inoculated; a number that cannot sensibly diminish the mortality of the small-pox in so populous a town, but yet sufficient to propagate the disease, as many hundreds promiscuously mixt with them through the town are incautiously exposed to the infection. It appeared from the general survey,



survey, that 1385 persons had the small-pox in 1774, though many still remained uninfected; previous therefore to this epidemic, the chances were very numerous of catching infection from inoculated patients. And, in fact, many instances might be produced of the epidemical small-pox, occasioned by inoculation, in various places.—There is another mischief arising from the present practice. Persons alarmed by the natural small-pox in their neighbourhood, are sometimes inoculated after they have caught the natural infection. Many supposed failures of success from inoculation are probably to be attributed to this cause, so that an unjust imputation falls upon this most salutary discovery.

It may possibly be objected to general inoculation, that young infants must become the subjects of the operation, at a time of life when they are most liable to other fatal diseases, and that the deaths occasioned by other causes may be attributed to inoculation. This dangerous period reaches at least to two years old. But in the epidemic of 1777, of those to whom it was fatal, 63, nearly one half, were under two years old. The mortality of  
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the distemper in early infancy is confirmed by many other facts in this and other places. Hence it is evident that inoculation must be general in order to be most useful to the community. Indeed whenever young infants can conveniently be taken out of town, or otherwise certainly preserved from infection, it may be adviseable to defer their inoculation till the next general period.

It will not be deemed unnecessary to take notice of a groundless prejudice on this subject—that the small pox by inoculation does not certainly exempt a person from the natural small-pox. This disease has some symptoms common to others, and some peculiar to itself. Tho' no disorder of the human body is generally more distinguishable from all others than the small-pox, yet in some rare instances, both from the natural infection and inoculation, doubtful cases occur, where the patient has only the common and not the peculiar symptoms. In a very few of these doubtful cases, the small pox has succeeded, otherwise they would not have been doubtful. But, in Britain, for 56 years, during which inoculation has been practised, not a *single* ex-  
ample

ample has been produced where the disease was first *undoubtedly* had by inoculation, and afterwards by the natural infection. The plain inference from this observation is, that in doubtful cases followed by the small-pox, the former symptoms had been occasioned by a different disease.

ANOTHER opinion concerning inoculation may require a few remarks. A prejudice too generally prevails that the matter taken from a small-pox patient, for the purpose of inoculation, conveys not only this disease but others with which the patient is afflicted. If there were any foundation for this notion, it would afford the strongest argument in favour of inoculation that could be produced. The natural small-pox is also generated by matter that comes from the body of a small-pox patient, and if it also convey all the other diseases of the patient whence it comes, it is surely of the greatest importance that the infectious person should be determined on by choice, and not, as at present, by accident. It would be in vain to attempt particularly to refute every absurd notion that prejudice has propagated on this subject. Every kind of

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ailment,



ailment, for many years after inoculation, is most preposterously attributed to this cause, as if it were expected to exempt the patient not only from the natural small-pox, but every other disease. Some have imagined that even the scrofula has been propagated by inoculation, because boils and other abscesses sometimes follow both the natural and artificial small-pox. But it is sufficient to answer, what every medical practitioner must have observed, that the scrofula is not an infectious disease. However, on this subject, arguments will be less convincing than authorities; and, fortunately, one of the most respectable can be produced.

THE *learned delegates of the faculty of Medicine at Paris, appointed to inquire into the advantages or disadvantages from inoculation of the small-pox*, sent in 1764, some questions on this important subject, to the elder Dr. Alexander Monro of Edinburgh. The testimony of this gentleman, near the close of a long and illustrious life, must be of the greatest weight both on account of his eminent skill in medicine, anatomy, and surgery, and the improbability that he could then be influenced by



by any interested motives. But not contented with giving his own opinion, he sent these questions to most of the medical practitioners in Scotland, being connected with them as their teacher in various branches of physic. His answers therefore are drawn from the united testimony of nearly the whole kingdom—from observations on 5554, cases, by 90 physicians and surgeons, besides those of Edinburgh.

“ Q. Do you know that other diseases have been ingrafted with the small-pox by inoculation ?

“ A. I never saw other diseases communicated by inoculation ; and my correspondents agree with me in this negative.

“ Q. Whether did other diseases happen more frequently or seldomer after inoculation than after the natural small-pox ?

A. My correspondents seem all to agree that there are not near so numerous or various bad consequences after inoculation, as after the small-pox by natural infection ; and

when I assure you that I have been so fortunate, or perhaps timorously cautious, that not one of those whose inoculation I advised, had a dangerous symptom during the disease, nor a bad consequence from it, you will conclude that I must be of the same opinion with them."

INDEED the prejudice, even of the common people, against this salutary art, appears to be greatly abated by their seeing such numerous examples of its wonderful success. For whole villages in this neighbourhood, and many other parts of Britain, have been inoculated with one consent. And it cannot be supposed that the inhabitants of towns are more ignorant or more obstinate. There is not a reasonable doubt that our poor fellow-citizens would eagerly and universally embrace a proposal to preserve their children from death and deformity, if the intelligent and opulent would humanely exert their influence and assistance to carry it into execution.

1. A PROPOSED PLAN FOR A GENERAL INOCULATION.

Suppose,

1st. THAT 5 shillings, or                      for each poor patient, be allowed to the inoculator\*.

2d. THAT 2 shillings, or                      be given to the parents who are most indigent, as a reward for nursing each of their children, properly during inoculation. [Or, suppose 5 shillings be appointed as a reward for nursing a single child, and 2 shillings for each of the rest\*.]

3d. THAT a subscriber of a GUINEA shall have the privilege of recommending three persons to be inoculated with the rewards, or

\* The medical members of the society unanimously declined to accept any pecuniary recompense for inoculating their poor fellow-citizens. And the reward for nursing, after the first general inoculation, was thought improper. So that all the contributions of the establishment are now expended in preserving the town from the infection of the natural small-pox.

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four that do not require them; and so in proportion for any larger sum. That a subscriber of HALF A GUINEA shall recommend one patient with the reward, or two without; of SEVEN SHILLINGS, one patient with the reward; of a CROWN, one without it. Whatever alteration is thought proper in the rewards, &c. the number of patients to be recommended by each subscriber must accordingly be changed.

4th. THAT a benefaction of TEN GUINEAS shall give the privilege for life of recommending the same number of patients as the annual subscription of a guinea; and after the same rate for greater benefactions. Though this sum, in so healthy a situation as Chester, be less than the calculated proportion, yet as such benefactions, if sufficiently numerous, might give a permanency to the establishment, they would, on this account, more effectually promote the benevolent purpose of the institution.

5th. THAT the Surgeons and Apothecaries of Chester, who are desirous to assist in the execution of this charity, offer their service  
to



to the Society; that the subscribers approve of those who are known to have sufficient skill and experience in inoculation. That the town be distributed into as many districts as there are inoculators appointed, one of whom is to be allotted to each.

6th. THAT the Physicians attend gratis, whenever desired by the inoculators.

7th. THAT a general inoculation may be performed every second year, or perhaps at longer periods, taking care, in the interval, to prevent the natural small-pox from spreading infection among the young generation.

8th. THAT the independent citizens, who do not want the assistance of this charity, be earnestly requested to defer inoculation till the general period; and that the medical practitioners be desired to use their influence for the same purpose: if circumstances require this rule to be transgressed, to acquaint the Society, that they may take measures to prevent infection being propagated.

9th. THAT a contributor who does not reside in Chester, shall have liberty to appoint a person to recommend patients in his name.

10th. THAT no innkeeper allow any person to be inoculated in his own house. This regulation is greatly for his own interest, as well as the public good. If it be strictly observed, as it easily may, strangers may pass thro' the town during the time of general inoculation, without being exposed to the danger of infection. At present, fear of the natural small-pox prevents many of the neighbouring gentry and others from frequenting the place, greatly to the disadvantage of the inns, as well as all the trading part of the town.

## II. PROPOSED REGULATIONS FOR PREVENTING, AS MUCH AS POS- SIBLE, THE PROPAGATION OF THE NATURAL SMALL-POX.

Suppose,

1st. THAT in the interval between the periods of inoculation, an exact account be kept of the name, street, and time when each family begins and ceases to be infected by the natural small-pox. That in order to obtain the earliest information on this subject, a small reward (as half a crown, or a shilling, or ) be offered to the parents, or any other person, who first gives notice to the society, that a fresh family is infected.

2d. THAT a promissory note of be given by the society to the parents of the infected family, payable a month after the small-pox has ceased in that family, on condition that they had practised faithfully the proper methods of preserving their neighbours and acquaintance from infection, in which they shall be fully instructed. The reward

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might



might be doubled, if their endeavours were successful, which would always be the case, if the methods were strictly observed. This disease is communicated by infectious persons, clothes, &c. and the poison might certainly be destroyed by cleanliness, and other easy methods of purification. The small additional expence of these rewards would probably be supplied by the surplus of the inoculating fund, as every subscriber would scarcely recommend his full number of patients. But if there should be any deficiency to support these regulations, one Charity Assembly would supply a fund of rewards for many years, if it produced no larger a sum than is here contributed by that method, once at least every winter, to relieve a single distressed family.

As perhaps there never was an attempt to keep so large a town as Chester free from the natural small-pox, it might be apprehended, that the proposed method of preservation would be impracticable. The regulations, therefore, judged sufficient for this important purpose, if *exactly* observed, are submitted to the public consideration. As they are neither  
difficult



difficult nor expensive, it is hoped that the well-disposed will observe them from motives of humanity, and others, under proper inspection, from motives of profit.

[The RULES OF PREVENTION, which are printed in the INQUIRY, p. 118, were inserted here.]

N. B. ALL objections or improvements that relate to any part of this proposal, are requested to be freely communicated to the public meeting.

#### No. IV.

#### FORMS OF CERTIFICATES.

I. I certify that No.

is intitled to no reward ; as I have seen this family transgress the *Rules of Prevention*, or received authentic Information of such transgression, during the time they were ill of the small-pox, particularly in the following instances, namely,

Inspector,

Dated

Z. 2 I certify

2. I certify that I have frequently visited the family of No.

during the time they were ill of the small-pox, and that I never discovered, or heard, that they transgressed the *Rules of Prevention* in a single instance. But there has probably been some unobserved transgression of the rules; as children of their neighbours, or acquaintance, have been attacked by the small-pox, either during the time it was in the said family, or within 16 Days after it had ceased therein, on the of But as of their neighbours remain uninfected, is consequently intitled to half a crown reward.

Inspector.

Dated

3. I certify that the family of No. have faithfully observed the *Rules of Prevention*; and that none of their neighbours or acquaintance has been seized with the small-pox, either during the time it was in this family, or for 16 Days after the last scab had dropt off; which happened

pened on the                      of                      tho'  
 children liable to the distemper live within  
                     doors of the said family.  
 is consequently intitled to the full reward of  
*five shillings.*

Inspector.

Dated.

4. I certify that the family of  
 No                      have faithfully observed the  
*Rules of Prevention*; and that none of their  
 neighbours or acquaintance has been seized  
 with the small-pox, either during the time it  
 was in this family, or for 16 Days after the  
 last scab had dropt off; which happened on  
 the                      of                      tho' the children  
 liable to the distemper live within  
 Doors of the said family.                      is con-  
 sequently intitled to the thanks of the society,  
 as                      will accept no pecuniary reward.

Inspector\*.

Dated

\* The *Certificate* is an improved method of trans-  
 acting this business; and may suggest a farther im-  
 provement. The xith column of the *Register*, p. 122  
 of the INQUIRY, may give the "*Date and kind of Cer-*  
*tificate*" which will be useful information.

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MINUTE BOOK No. V.

[GENERAL CERTIFICATE, 4th November, 1778. See the INQUIRY, p. 123.]

MINUTE BOOK No. VI.

### PARAGRAPHS from the CHESTER NEWS-PAPERS.

1. WE have had authentic information that Elizabeth Bryly (a poor woman in Sty-lane, Handbridge) received the reward of TEN SHILLINGS, on Thursday the 9th of this inst. April, 1778, from *the Society for promoting General Inoculation, at stated periods, and preventing the natural Small-Pox in Chester*; because she had faithfully and *successfully* followed their directions. Twelve weeks ago two of her children were attacked by this dreadful distemper, and of so malignant a kind that one of them died; yet, excepting a boy who had been in the sick chamber before the directions were given, not a single child has caught the disease, tho' two were liable to it even at the next door, and not fewer than 26 in the near neighbourhood. Although this event happened before the Society was established, yet the poor woman

was



was thought to deserve the reward, because, by following *their* rules of prevention, she had given a seasonable check to the distemper, which had not been in this part of the lane, nor generally epidemical in Handbridge, for three years, so that had it spread from her children it might probably have soon destroyed great numbers in this quarter of the town.---We are informed that the future meetings of the Society will be held at the Infirmary every Tuesday morning, immediately after the business of the House is transacted; and that Mr. Owen, of the Infirmary, will receive contributions to the charity from any who are desirous to keep the town free from the natural Small-Pox, and to save the lives of their fellow citizens by inoculation. He is authorized to give a *reward* to any person who first communicates information that a fresh family in Chester is infected by the Small Pox.

2. AT a general meeting of the SMALL-POX Society, held the 9th of Nov. 1779, at the Infirmary, it appeared, from the Report of their Inspector, that since Nov. 4, 1778, the distemper had been stopt, by the regulations

lations of the Society, in 37 different places of Chester, that in 32 of these it had been stopt without infecting a second family, and in three, out of the remaining five places, after infecting a second family only, in the neighbourhood: that from want of early information and other irregularities, it had spread more generally in Boughton than any other part of the town; the number at present ill of the distemper in that quarter being seven, in all others eight. It appeared to the Society very practicable to prevent the Small-Pox from spreading in Chester, if *aided* and *assisted* by their fellow citizens. The chief mischief has arisen for want of early intelligence. If the benevolent and humane would give *immediate* information to the Inspector, Mr. Owens, as soon as a fresh family is known to be attacked by the Small Pox, they would not only save much expence to the charity, but the lives of many inhabitants. A Committee was appointed to meet the first Tuesday of every month, to extinguish the contagion, by distributing rewards, and executing other regulations for that purpose.

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THE *thanks* of the Society for observing their *Rules of Prevention*, without any pecuniary reward, were given to Dr. Denton, Mr. Harrifon, Mr. Ridgway, Mr. Walker, Mr. Ratcliffe, Mr. Pratchitt, Mr. Palin, Mr. Bushel, Mr. Whittell, Mr. Bennion, Mr. Backarn, and particularly to Mr. Bramwell for directing such regulations to be faithfully executed as prevented the Small-pox from spreading thro' the Workhouse, tho' several had been infected there before the distemper was discovered.

Dec. 7, 1779.

3. AT the monthly meeting of the small-pox Society, on the 7th instant, it appeared, from the Inspector's report, that the number of small-pox patients in this city had this month decreased from 15 to 7, of whom three are strangers; and that the contagion had been extinguished, during the last month, in four different places of the city. On this occasion, several received the rewards of the Society for preventing the distemper from spreading, who had many next-door neigh-

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bours



bours liable to the small-pox, and yet not one of them caught the infection.

### No. VII.

To *Wm. Hall Esq. Secy. of the* Member of the  
SMALL-POX SOCIETY.

THE Small-pox Society has been established near two years. During this time, the distemper has been frequently brought into Chester from the neighbouring towns and villages, appearing in different parts of the city, so that no person, liable to be infected, could have walked with safety on our walls or in our rows. The regulations of the Society have prevented the danger of catching the Small-pox, not only in these places of public resort, but have, in numerous instances, stopt its progress among the poorest class of our inhabitants, who were surrounded, even at the next door, by children liable to the distemper. The money expended in rewards, besides the purpose of checking the fatal ravages of the natural Small-pox, has also afforded a most seasonable relief to many distressed families, whose poverty and wretchedness

edness were greatly aggravated by the visitation of such a pestilence. You have the satisfaction to reflect, that, under providence, your bounty has been the means of saving the lives of many children, who would otherwise have perished by this destructive distemper.

INOCULATION, at proper intervals, was from the first made a part of the benevolent institution ; since, as the small-pox continued to prevail unchecked through the rest of the kingdom, there would obviously be little advantage in securing the inhabitants of Chester from a disease while young, which they would inevitably catch as soon as they were old enough to have any intercourse with their neighbours. It is now judged expedient to propose general inoculation, in order effectually to preserve the young generation hitherto spared from the natural small-pox. That the attempt can do no harm there is the clearest evidence to prove. It appeared from authentic facts \* laid before the GENERAL MEETING, that previous to the estab-

\* See the PROPOSAL, p. 155.

lishment of the Society, the small-pox prevailed so generally in Chester, and so nearly did all the mischief it was capable of producing, that if only nine patients were to be inoculated annually by this institution, it would counterbalance all the possible injury that could be effected by more extensively spreading the contagion. On the other hand, the advantages to be gained by suppressing the natural and communicating the inoculated small-pox, are the greatest that human art can bestow, in respect to the preservation of life. And as the good to be derived from this charity will be exactly in proportion as it is generally accepted, we earnestly intreat you to disperse by a servant the inclosed *Address to the inhabitants of Chester*, and to explain to your ignorant and indigent neighbours and dependents the benevolent purpose of the Society, and to exert all your influence over them, not to neglect the offered blessing. You are authorized by the unanimous resolution of the general meeting, to recommend as many patients as you judge proper. If you should be absent from Chester at the time of general inoculation, we request that you would immediately appoint some resident citizen,



citizen to recommend patients in your name. If any should persist in rejecting the good intended them, warn them, in strong terms, of the danger and criminality of wantonly catching infection from inoculated patients: indeed the most solicitous care will be taken that *these* shall not spread the distemper, unless their uninoculated neighbours shall be guilty of the most willful and blameable negligence.

AFTER mature deliberation, it has been judged necessary to give *rewards* to the most indigent parents, in order to allow them the means of subsistence while nursing their children under inoculation, and to secure their strict attention to all medical directions. Many of our fellow citizens earn their daily bread by their daily labour. We trust that none will be recommended for the *rewards* but such as are proper objects of the charity. The money which has been so generously and humanely bestowed, it is hoped will be prudently and judiciously expended.

*By order of the general meeting,*

THOMAS FALCONER, Chairman.

Chester, Feb. 11, 1780.

No.

## No. VIII.

ADDRESS to the INHABITANTS of  
CHESTER.

MANY of your fellow-citizens are deeply affected with compassion at the dreadful destruction made on great numbers of the poor children in this city, by the natural small-pox, while the lives of their own families and relations are preserved by inoculation. This salutary art has been practised in England near 60 years with the happiest success; and few, who can afford the expence, now neglect this method of preserving their offspring. And as it is to be supposed that a poor man's children are as dear to him as a rich man's there can be little doubt, that, if he had the same ability, he would use the same means to save their lives. What we deem the kindest office in our power to bestow on our dearest connections, we now offer to all the citizens of Chester, who need our assistance, free and general inoculation, at your *own houses*, and under your own care. Neglect not this humane proposal. If you lose the  
present

present opportunity, another will probably never be offered.

You know that all the poor children in Chester are exposed to this infection in early infancy. Your choice can only be, whether to give it a few months sooner or later, whether to give a mild and safe disease by inoculation, or a most loathsome and dangerous illness by the natural infection; whether to have a sick family for a few days or hours only, or for many weeks. You are farther to consider, that it is not merely the *lives* of your children which have a better chance of being saved by inoculation; but that those dreadful consequences so frequently following the natural small-pox, such as blindness, lameness, and the like, which cause the unhappy sufferers to remain, for life, a burden to their parents or friends, are almost entirely unknown in the inoculated small-pox.

SHOULD any of you, however, refuse the benefit now offered, we warn you to avoid the danger of catching the infection from inoculated patients, which may be done by observing the following easy directions:

*suffer*



*suffer none of your family to enter an infectious house, nor allow any person or thing from an infectious house to approach near to those of your family who are liable to the distemper.*

It were to be wished, that as many of the independent citizens as could make it convenient, would take this opportunity of inoculating their children, for their own sake, as well as example to the rest. Tho' they will run little or no risk of catching the infection from inoculated patients, yet they are now in great danger from the natural small-pox, which, in spite of every effort of the society, is at present prevailing in several parts of the town. This mischief we believe, was chiefly occasioned by soldiers in the distemper, who *avowedly disobeyed* all rules. They have propagated the contagion in so many quarters, that it will be difficult, if not impossible, for a single inspector to *see* that our own citizens observe the regulations of the society, which many of them have formerly done with such commendable exactness. To these causes it must be attributed, that several persons of higher rank, of late, have been unfortunately attacked by the natural small-pox, and more melancholy

melancholy accidents of this kind, we have too much reason to apprehend. Tho' the natural small-pox, that at present prevails in Chester, is remarkably malignant and fatal, yet it by no means follows that the inoculated will be so. General inoculations have often been most successfully executed at the very time when the natural distemper has been most destructive.

WE have reflected that several of our fellow-citizens may be in such a situation that they cannot conveniently spare time, from the employment on which the subsistence of their family depends, to nurse their children during inoculation. The greatest objects of compassion might hence be unable to enjoy the benefit intended by this bounty. To persons in such circumstances we offer the following *rewards*, on condition that they exactly observe the rules that are judged necessary both for the welfare of their own family, and to prevent the distemper from being communicated to others.

IF then you have a proper regard for the health and lives of your children, and have a

due sense of your own duty and interest, you will not suffer yourselves to be swayed by any idle and groundless prejudice against inoculation; but will, with one mind, thankfully accept the blessing now offered by the goodness of providence, and the kindness—the free and bounteous kindness, of your fellow-citizens.

By order of the general meeting,  
*Chester, Feb. 11,* T. FALCONER,  
 1780. chairman.

## R E W A R D S.

shillings. children in a house.

5	}	for	}	1
7				2
8				3
9				4
10				5, &c.

[A catalogue of 149 members of the small-pox society were inserted, besides the]

## MEDICAL MEMBERS :

Dr. Denton.

Dr. Haygarth.

Dr. Currie.

Mr. Morrall.

Mess. Crewe and Harrison.

Mess. Brodhurst and Williamson.

Mess.



Mess. Johnson and Owens.

Mr. Sandbach.

Mr. Freeman.

No. IX.

REPORT OF THE SMALL-POX  
SOCIETY, CHESTER.

*General Meeting, March 27, 1781.*

WE judge it necessary to acquaint our fellow-citizens with our proceedings, since the General Meeting of Feb. 11th, 1780.

IN deference to the opinion of some respectable persons, an attempt was made, last Spring, to inoculate our poor people in an hospital. A commodious house, in a convenient situation, was fixed on for the purpose. After a week spent in inquiries for patients, by all the inoculators, not a single person could be found in Chester, who would enter an hospital for the sake of inoculation. The society then inoculated eighty-five children, each at their own houses. The most solicitous care was taken, for a fortnight before inoculation, to preserve these patients from the natural contagion, every where dispersed among them, and, after they became infectious, to prevent their communicating it to

others. They all recovered. Indeed not one of the whole number had a dangerous complaint during, or in consequence of, the disease, though the natural small-pox, at that very time, was remarkably fatal in the town. It is reasonable to expect that such success will render inoculation generally desired, at a future period. Inoculation did not, as some might apprehend, spread the contagion, but appeared to produce a quite contrary effect. For in the districts, where most patients were inoculated, there remained the fewest in the natural small-pox; and, in the districts where the smallest number were inoculated, the distemper was afterwards most general. We believe that only two were infected by inoculated patients; one of them was concealed from the inoculator, in the same house with a patient; the other had free intercourse with the infectious, being supposed to have before had the natural small-pox.

It may be proper to explain why the natural small-pox spread so generally through the town in February, March and April, 1780. The contagion was manifestly propagated by a new-raised regiment of soldiers, who were under no controul, being without their surgeon,

geon, and scarcely under the command of their officers, who did not receive commissions till their departure from Chester. One of these soldiers, walking about the town, with the small-pox upon him, in the most infectious stage of the distemper, was desired by our inspector to take care that he did no mischief by spreading it. His answer explained the conduct of them all; "nobody takes care of me, and I will take care of nobody." Many of these soldiers had the small-pox, and spread the distemper in every part of the city; the patients were so numerous and so widely dispersed, that a single inspector could not possibly see that the rules were observed. On this consideration, the regulations were suspended for some months. In future, the most attentive care of the society will be exerted to guard against the return of such a calamity.

THE regulations for preventing the natural small-pox, were again established on the first Tuesday in May. The town was then divided into six districts, each under the care of an inspector. During that month, the distemper was in Forest street, St. Olive's lane,  
Gols



Goss lane, Parsons lane, Crane street, Britain's entry, Nun's lane, Handbridge, Bridge street, and Northgate street. It was in twenty-five families; and in five out of the six districts. It appears, from the reports of the censors to the committee, that in all these places, except one, the contagion was totally extinguished on the 17th of June: That, in this district, the distemper was only checked, through the imperfect execution of the regulations, but not stopt, till the 9th of December, and till these irregularities (well known to the committee) were corrected: That, during this period, the small-pox appeared in two distant parts of the town, but the contagion was stopt in both places without infecting a second patient: That, since the above-recited perfect extinction of the contagion, it has been brought into Chester, twice from Liverpool, and once from Coventry: That the *rules of prevention*, in two instances (\* E. Williams' Crook lane, and Martha Billingham's, Cow lane) have preserved from the contagion, *two* persons, never infected, in the *same house*, and,

\* In this instance, the inspector had mistaken some other eruption for the small-pox; as Williams' child had afterwards this distemper.

in another instance (John Rawdon's, Hand bridge) *three* persons, never infected, in the *same family*, with a patient in the natural small-pox, during the whole disease. Such numerous examples have occurred to the society of preventing infection being communicated to persons liable to it, in the closely adjoining houses, that it would be tedious to mention them; and indeed must be thought superfluous, after the more difficult and more doubtful point has been ascertained, that they may be preserved while dwelling in the same house, and the same family.

AT present, there is not a single patient in the natural small-pox, in Chester.

FROM these *facts*, of which any person who entertains a doubt may easily be satisfied, it appears evident to the society, that their regulations to prevent the progress of the small-pox will be successful as far as they are executed. They add, with great satisfaction, that no citizen has transgressed the rules in a single instance, except through inadvertency, and no stranger, except the soldiers above-mentioned.

THE

THE society return thanks to Mrs. Smith of Parson's lane, Mrs. Bennett, of Crane street, and Mrs. Cook of Goss lane, for their gratuitous observance of the rules of prevention.

THOUGH the contagion is now so perfectly extinguished in this city, yet danger every where surrounds us. We are credibly informed that the natural small-pox did very lately, and probably does at present, rage with destructive violence in Liverpool, Manchester, Shrewsbury, and many other towns and villages in our neighbourhood, even so near as Boughton, where it has lately attacked one child; so that we cannot hope to preserve the inhabitants of Chester from this fatal malady without the steady attention and constant charge of the society.

THE committee expend with strict economy the money intrusted to their care. They hope to deserve the approbation of every subscriber and benefactor, and of others of their charitable fellow citizens, who only withhold their bounty till they are convinced that this humane institution will answer the ends for  
which



which it was established. The transactions above faithfully related, it is hoped, will help to produce such conviction. The money already subscribed is considerably less than will be required. The society, however, have no apprehension, that, in Chester, there will ever be a deficiency of charitable aid for such a humane purpose as securing our fellow citizens from so loathsome and so fatal a disease as the natural small-pox.

By order of the general meeting.

THO. FALCONER, Chairman.

## No. X.

### ADDRESS TO THE INHABITANTS OF CHESTER.

*Chester, Jan. 29, 1782.*

UNFORTUNATELY, the small-pox, and of a very mortal kind, at present prevails in several parts of this city. Two years ago, when this distemper raged fatally among us, a general inoculation was proposed by the small pox society. All who accepted this benevolent proposal, though some under one month old, passed through the disease, in the most favourable manner: an event so recent and so well known in this place, ought to produce general conviction of its safety.

WE hear, with great satisfaction, that there has lately been 416 patients inoculated at Liverpool, of whom only one died.

A FREE inoculation is again offered to such of our fellow-citizens as may require our aid, to save the lives of their offspring from this fatal pestilence; provided they bring a recommendation from any of the following members of the small-pox society, within the next ensuing ten Days; otherwise they must be excluded from the benefit now humanely intended for their preservation.

[Catalogue of members.]

THE committee of the small-pox society think it their duty to acquaint their fellow-citizens, especially the humane benefactors to this charity, that this dreadful distemper is now spreading in Chester; and that this calamity has manifestly proceeded from numerous transgressions of the regulations proposed by the society. The chief occasion of this misfortune has been a want of early information after a family became infectious, so  
that,

that, in many instances, the inspectors had not received intelligence of the distemper, till two or three weeks after it had appeared in a family, and not till it was quite over in many other families; in the former case, much mischief was done before the *Rules of Prevention* were delivered to them, and in the latter case, they received no *Rules* at all. This want of early intelligence, we are clearly convinced, has, in great measure, been occasioned, by not giving the *Reward for Information*, so punctually and so promptly as ought to have been done, and by its not being generally known that such reward might be obtained. Both these errors, the committee have taken measures to correct, and in a manner that they trust will be effectual.

THOUGH we lament, most sincerely, that these irregularities have dispersed this destructive contagion in many parts of the town, yet they shew, in the clearest light, the great utility of our preventive measures. During the experience of near four years, *not a single fact has occurred* to prove that the regulations of the society have been insufficient to prevent the distemper from spreading, when perfectly



fectly executed; nor that any of them are impracticable.

THE several observations here advanced, are founded upon facts which were particularly stated at the committee held this day, where most of the medical, and many other members were present, to their unanimous satisfaction.

THE inoculators as well as the inspectors, will now unite their most assiduous attention to prevent, as far as possible, the infection from spreading, before the general inoculation, lest their inoculated patients might previously have received the natural distemper, and unmerited blame fall upon this salutary art. There must be some risk of this kind, at the time of a spreading contagion, but we rely on the candour and discernment of our fellow citizens to attribute such failure of success, if any should happen, to the true cause.

THOMAS FALCONER,  
chairman.

## No. XI.

## REPORT of the SMALL-POX SOCIETY at CHESTER,

*General Meeting, Sept. 17, 1782.*

THIS institution having existed four years in March last, and there having been two general inoculations, we shall review the principal facts that have occurred to our observation.

LAST spring, 128 poor children were inoculated by the members of the Small-pox society; these, added to the 85 inoculated in the spring of 1780, make the whole number 213; during the last four years, 203 private patients have been inoculated: in all four hundred and sixteen. Two infants have died after inoculation, tho' there are doubts, in both cases, whether in consequence of that operation: there was reason to suspect that one of the patients had previously received the natural infection, and the death of the other might not improbably be attributed to a disorder of the bowels. Hence its degree of mortality in Chester, since the society was established,

established, if both the deaths above-mentioned were occasioned by inoculation, has been only one in 208. The dreadful fatality of the natural Small pox is so well known, that it seems impossible to account for the reluctance which the common people still have to partake the benefit of this salutary art.

We will next state the difficulty and the success of our endeavours to prevent the progress of the natural Small-pox. The same people who refused inoculation, and they are a large proportion of the inhabitants, are fearless or rather desirous that their children should be infected with the natural small-pox. It is with concern we remark, that in one part of the town (Cross-gun entry, Forest-street) the Inhabitants, disregarding the inspector's exhortations, have purposely propagated the distemper, carrying the poison, and even the patients, from one house to another, without reserve. In consequence of this conduct, it spread thro' 15 families, infecting all in this entry liable to it, and proved fatal to several. In another quarter, the poor people allowed their children to have an unreserved intercourse with the infectious.



fectious. This irregularity in part proceeded from their ignorance that some money might be obtained by observing the rules. The hope of procuring the reward has had some influence on their conduct, and the infection is nearly extinguished, though many of their neighbours are liable to receive it. These two instances of irregularity, though very unfortunate, yet, when contrasted with the numerous facts where the progress of the distemper was stopt by observing the rules, afford the clearest proof how useful the preventive regulations might become if properly observed.

HOWEVER wonderful it may seem, we believe, in several other cases, that the parents who rejected the proposal of inoculating their children, purposely exposed them to catch the natural infection. Though some of our fellow-citizens are so careless in dispersing the deadly poison of the Small-pox, yet they would regard with horror any person who should purposely administer arsenic or any other deadly poison to innocent infants.

THEIR

THEIR conduct clearly proceeds from a popular delusion, which it is our duty to correct and oppose. It is manifest that many lives may be saved by the preventive regulations of the society, and yet the most prejudiced eye cannot discern or suspect that they can be productive of the least possible mischief. Such unaccountable infatuation will surely not always prevail. As, in their situation, the Small-pox is clearly unavoidable either by the natural or artificial infection, we may hope that reason and the example of their more intelligent neighbours, will, ere long, teach them to prefer inoculation, which is more than 20 times less dangerous, and occasions less than a 20th part of the pain and misery. If these hopes be well founded (and they are founded on a very general principle in human nature, parental affection) the chief difficulty with which this society has contended, will proportionably diminish.

Soon after the society was established, the natural distemper began to spread so quickly in Handbridge, thro' the irregularity of the inhabitants

inhabitants in this remote part of the town, and our funds were at that time so low, as to cause an apprehension that the rewards of prevention might become too expensive; on these considerations, the regulations were suspended in that quarter for some months; during the *suspension*, 16 died of the natural Small-pox in this parish; and in the spring of 1780, the distemper was spread so widely by soldiers, as explained in the last report, as to occasion a *general suspension* of the regulations for some months; during this time, the deaths by the natural distemper amounted to 58. Taking the whole period of four years, ending March 30, 1782, the Small-pox has been fatal to 139, or 35 annually. If we deduct the above-mentioned 16 and 58, who died during the interval when the regulations were not executed, the total deaths would be only 55, or 14 annually; whereas the annual average of deaths by this distemper for six years previous to the establishment of this society, was 63. Hence its fatality has been actually reduced to near *one half*; and, if we may deduct the numbers who died during the two periods, when the regulations were suspended, to near *one fifth*.



This degree of success will appear wonderful to any one who impartially considers how disadvantageous the prejudices above described must prove to our proceedings, as they so generally and so constantly counteract the endeavours of the society to prevent the contagion from spreading: the fatality of this distemper may be reduced to near a *twentieth* part, that is, from 63 to 3, if all the inhabitants and their neighbours anxiously united their endeavours to avoid the natural, and to obtain the inoculated Small-pox.

The inspectors were particularly instructed to observe whether the natural Small pox was received from inoculated patients. On the most careful inquiry, one private and one or two public patients appeared to have communicated the natural distemper; and, in all these instances, the persons infected had unreserved intercourse with the infectious, without any wish to avoid them.

The thanks of the society for observing the rules of prevention *gratis*, were given to Captain Sarsfield, Captain Briscoe, Mr. Millington, Mr. Jones, Mr. Smith, Mr. Linney,  
Mr.

Mr. Johnson, Mr. Presbury, Mr. Whittel, and Mr. Cowdroy.

SINCE the last report, the Small-pox has been extinguished, where several in the neighbourhood were liable to infection, in a great many parts of this town.

DURING the year 1781, only eight persons died of this distemper in Chester, of whom two were infected *in* Manchester, a third *in* Liverpool, and a child of the fourth *in* Coventry. Tho' the contagion has been so often extinguished, yet it is again brought so frequently among us from the neighbouring towns and villages, that Chester has not been perfectly free more than a few weeks, since the society was established. The distemper has been, for some months, in various parts of the town: After a difficult and expensive struggle, the contagion is again nearly extinguished. At present the Small-pox is only in *four* families in Chester. Considering what great numbers are liable and willing to catch the infection, this happy success must be attributed to the attention and vigilance of the inspectors.

THE medical members have unanimously declined to accept the offered gratuity for inoculating the poor patients; deeming the heart-felt satisfaction of preserving the lives of their fellow-citizens a sufficient recompence for their trouble.

ON mature consideration, we have thought proper to abolish the rewards to the inoculated patients. At the first general inoculation, the measure appeared necessary to overcome inveterate prejudices; but it now seems to hold out an improper motive, which would have a pernicious influence. It is regarded by many as a bribe to do what they think wrong. To have the children of our poor neighbours preserved, as far as in our power, from death and misery, should be the only, and is surely a sufficient inducement for them to *accept of gratis* inoculation.

THE two principal expences of this establishment are thus taken away. The chief charges which remain are the salaries of the inspectors, and the rewards to infectious families for observing the rules of prevention.

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The great attention and diligence of the inspectors amply deserve the salaries which they have obtained: Indeed their services have been thought highly to merit other *honorary* rewards. The money for observing the rules is only given to the poorest families, and at a season too when poverty is most distressing, on the visitation of a most loathsome distemper. Independent of every other consideration, the humane could not find more proper objects for their charitable relief. The fear of incurring greater expence than our funds can supply, has induced us to offer too small rewards to infectious families. At present a perfect observance of the rules intitles the family to five shillings only: A greater reward would command more care and attention, and would, of consequence, be more frequently successful.

For this humane and beneficent purpose, we are sorry to observe, that our fund is likely to become deficient, and are therefore under the necessity of again soliciting the charitable aid of our fellow citizens and other well-wishers to Chester. If the deficient sum could be supplied by small *subscriptions* of a

CROWN,

*crowns*, or *half-a-guinea* or a *guinea* annually, or by proportionable *benefactions* for life, or by small *occasional donations*: And if all the members of the society would cordially unite their influence to prevent the natural contagion from spreading, we have reason to hope that our endeavours to check the ravages of this fatal distemper might be attended with much greater success. On this occasion, such charitable aid would be particularly seasonable; because, if the regulations be now suspended, and, without fresh contributions, our income may not be sufficient, as appears from the annexed account, its destruction of the poor children would be dreadful. In many of the surrounding towns and villages, the Small-pox now generally and fatally prevails. It will be often brought among us, and fresh expence will frequently be incurred to stop its progress. As the greatest mischief has arisen from a want of early notice, when the distemper appeared in a family, we earnestly intreat the humane, whether a subscriber to the charity or not, particularly all affectionate parents, who wish to preserve their children from this mortal malady, to send immediate information to the inspector  
of

of the district, below named, as soon as they hear a fresh family is infected.

It is with the sincerest satisfaction we observe, that our example has excited a like, beneficent spirit toward the poor inhabitants of other large towns. In Leeds they had a general inoculation in the spring of 1781, and proposed another in 1782; in Liverpool a general inoculation was successfully executed in the autumn of 1781, and another in the spring of 1782, and they have resolved on a general inoculation there *twice every* year. Such has been the success that has attended these exertions at Chester, Leeds, and Liverpool, that the Royal College of Physicians at Edinburgh have appointed a committee to inquire into their mode of conducting the gratis inoculation of the poor, in order to diffuse the benefit of this salutary art among all ranks in the metropolis, and probably other large towns of Scotland. And it may be reasonably expected that the same benevolent disposition which has promoted general inoculation in these places, will ere long be employed to check the progress of the natural distemper, an important object which



which has principally engaged the attention of our society ever since its establishment.

Of all the children who died in Chester under ten years old, during the six years which preceded this institution, a *full third part* died of the Small-pox. It is probably fatal to as great a proportion of the young generation in other large towns of Great-Britain. If, in the places above mentioned, their physicians, who are so highly and so justly celebrated for knowledge and humanity, would establish regulations to prevent the propagation of this deadly pestilence, our united example and influence might prove of great importance to our country and to mankind.

THOMAS FALCONER.

Chairman.

Receipts, 1899 2. 6

Disbursements for 4 years,        - 170   3   0

*Inspectors*, Mr. Warrington, Mr. Meacock,  
Mr. Connah, Mr. Venables, Mr. Light-  
foot, Mr. Jackson.

General Inspector, Mr. Owens.

Secretary, Mr. Wilkinson.

CON-

## CONCLUSION OF THE INQUIRY, addressed to the *Medical Reader*.

**I** Submit to your deliberate consideration, as a question which it is peculiarly your duty to determine, whether it is medically possible to prevent the Small-pox. A dark cloud of vulgar prejudices has long obscured this subject. But all the mischief appears to have originated from the two opinions particularly discussed in the INQUIRY; namely, 1st. “ That clothes, &c. “ are rendered infectious by variolous “ miasms;” and 2d. “ That the atmosphere of the place in general is “ contaminated, where the Small pox “ is epidemical.”

WHILE these opinions prevail, it must be deemed most absurd to propose any human means to prevent the distemper.

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I HAVE

I HAVE attempted to prove that no person will be ever attacked by the Small-pox, except after “infection by  
 “*nearly* approaching a Small-pox pa-  
 “tient, or the variolous poison in the  
 “state of serum pus or scab.”

If this proposition be true, and, if the medical faculty, with the more intelligent part of mankind could be convinced of its truth, the chief difficulty would be vanquished. If it were generally known that the Small-pox is produced by a peculiar poison, which might be certainly destroyed, and which could never do mischief, except through carelessness or malevolence, it would soon be thought as criminal, being infinitely more destructive, for a person to convey the variolous poison to those who are liable to infection, as to mix arsenic with their food. On this foundation, I venture to suspect that medi-  
 cal



cal errors have led mankind into the most pernicious *habits*. If this suspicion be well founded, it is the duty of physicians to reconsider this important question with due deliberation.

I SHALL shortly state the evidence, which the experience of the Small-pox society, during six years, has uniformly supplied, to refute these two opinions. Some explanation and apology may be required, by the medical reader, for the mode in which the PROCEEDINGS of the society are composed.

I WROTE them as a citizen of Chester, not as a physician; otherwise, the numerous facts which they contain, might have been applied, in a much more direct manner, to prove the doctrine maintained in the INQUIRY. In regard to the *truth* of the facts which they briefly state, it should be observed, that they are ascertained with a great

degree of authenticity, by a committee consisting of all the medical, and many other intelligent members of the society. The poor people, who claim rewards, come regularly before these gentlemen every month. The full reward is not to be obtained, except by those who have preserved *all* their neighbours, and acquaintance from the infection. Besides a written certificate from their inspector, they are examined in presence of others, who have in some instances, transgressed the rules, and whose reward is consequently diminished: these would complain of injustice, if there were any pretence for complaint. In regard to the other facts related in the INQUIRY, I have generally quoted the authority of medical witnesses in confirmation of my own testimony. Many of their names (*a*) are universally known, and highly respected by

(*a*) See the INQUIRY, p. 35, 36, 51, 107, 112, 113, 186, 187, 208, and the addendum, last page.

the medical world ; and the judgement and veracity of them all are acknowledged by their numerous acquaintance. Names and dates are always mentioned, so that, if any doubt should arise, inquiry may still be made, concerning such recent events, whether the narrative be accurately true.

1. DURING the whole period of six years, the progress of the Small-pox has been carefully watched by the inspectors, and the cause of infection investigated with all possible diligence, and attention : but, not a single fact has occurred to excite a suspicion that variolous miasms, adhering to clothes, had communicated the distemper. Yet, during the whole period, except a few weeks, all the medical practitioners occasionally visited small-pox patients, and the inspectors daily entered the infectious chambers : In the same clothes, without the least reserve, they approached

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ed children liable to the infection, but, in no instance, were known or suspected to have communicated the distemper. A body of such evidence must remove every rational doubt.

2. THE Small-pox society have had proofs still more numerous and positive, that the infectious atmosphere, which surrounds the variolous person, is limited within a small circumference. The facts stated in the 97th, 104th, 107th and 125th pages of the INQUIRY, exhibit the clearest and fullest evidence on this point; they establish it so far beyond all controversy, that I purposely omitted, in the future PROCEEDINGS of the Society, any other proof, as altogether superfluous. But it may be proper to declare that the whole experience of the society has uniformly confirmed this opinion. During the last six years, few weeks have elapsed, without supplying positive

tive proofs that the infectious influence did not extend to the closely adjoining houses. Yet all medical readers may recollect numerous instances, in that period, when this distemper has prevailed, in other towns and villages, so as to become generally epidemical.

BUT on a point where the conclusion may lead to such important consequences, I am solicitous to be instructed by the united wisdom, and experience of my medical brethren. If the arguments of the *INQUIRY* be erroneous, the *Queries* annexed to it seem well adapted to detect such errors. To these, I beg leave to solicit the particular attention of the medical reader. If you answer the 1st, 3d or 4th query in the affirmative; or the 2d and 5th query in the negative, I request an exact detail of every circumstance concerning the facts on which such an answer is founded.

THE whole tenour of the PROCEEDINGS of the Society, tho' constantly counteracted by the most pernicious prejudices, afford decisive evidence in support of the theory advanced in the INQUIRY, according to the test of a true theory sagaciously and judiciously proposed by the great Lord Bacon.

“ Inter signa, nullum magis certum  
 “ aut nobile est, quam quod ex fructi-  
 “ bus. Fructus enim et opera inventa,  
 “ pro veritate philosopharum velut  
 “ sponsores, vel fide iussores sunt (*b*).

THE letter from Dr. Waterhouse is curious and instructive. It is much more satisfactory to say, that the Small-pox has been exterminated, than that it might be exterminated, by civil regulations. However, I would not propose the proceedings of Rhode-Island as

(*b*) *Novi Organi Lib. 1. §. 73.*

by



an example for imitation. They seem to have been suggested by fear, not by reason, and a clear discernment of the danger. They have established many unnecessary restrictions, and difficulties. Among these, I would reckon the tremendous coffin, in which the patients were shut up alive ; their transportation to a desert island ; boarding up the street ; placing guards to keep passengers at a distance from the infectious house ; and many other troublesome and useless regulations. It is probable, that these unnecessary difficulties, and the supposed peculiar advantages of a small island so near the capital, Newport, may have been the cause why their method of exterminating the Small-pox has not been more generally imitated. Dr. Waterhouse computes the inhabitants of Newport to be about 11,000. The rest of the island is fully peopled. Besides the principal Port, there are, I believe, two or three ferries, and those

nearly adjoining the several large towns on the continent. It is the great thoroughfare between the northern and southern Provinces. I have been informed, on good authority, that there are two roads, the whole length of the island, one for horses, hilly and nearer, the other for carriages. Their connections with foreign countries is remarkably extensive. Combine all these circumstances together, and I doubt whether there be another island in the whole world, whose intercourse with their neighbours and with distant countries is so general, and, consequently, no island is so liable to receive the variolous poison from every quarter. The inhabitants of Britain are comparatively in retired and remote situations as to the danger of receiving foreign infection. Dr. Waterhouse observes, that the Small-pox is more commonly brought from the neighbouring continent, than distant countries, that is, by

by the market people, and travellers that come by the ferries, than by ships arriving at their principal port. But Britain has no such near communication with her neighbours, by ferries.

HOWEVER, this country is by no means prepared for such a proposal. To correct the pernicious errors, and habits that have universally pervaded the kingdom, no means could possibly prove so effectual as the establishment of Small-pox societies, to stop the ravages of this dreadful pestilence. In large towns, there would be most difficulties to contend with ; because, in them, the Small-pox is generally present ; and never feared or avoided. But, even in large towns, the difficulties are such as would rather animate than discourage the truly benevolent mind. The distemper, in such places, does every possible injury \*. The attempt is so far from being attended with any hazard, that some benefit must

\* See the PROCEEDINGS, p. 155.



result from all preventive regulations, even should they fail of being completely successful. I entertain sanguine hopes that medical gentlemen may form associations on disinterested benevolent principles. They are the most frequent witnesses of the deplorable sufferings occasioned by this loathsome distemper. Their thoughts, in the daily exercise of their profession, are so constantly and so anxiously exerted to save life and to relieve misery, that they enjoy perhaps a higher satisfaction than others, from the gratification of these humane sentiments. On these considerations, a proposal which would answer both these benevolent purposes in no inconsiderable degree, will probably receive their most strenuous support. They can best obviate the difficulties, discern the advantages, and demonstrate the practicability of such a plan. They may promote such establishments with all the zeal that their humanity dictates, without

out incurring the remotest suspicion of a self-interested motive. The moderate expence of such an institution can nowhere be an object of difficulty. On the contrary, it may be reasonably hoped, that the most intelligent and humane inhabitants, forming themselves into a society, on the purest principles of beneficence, by transfusing this spirit into the breast of each other, and of their acquaintance, would excite, among all ranks, an anxiety and active exertion, to promote its success.

STRONGLY impressed with an opinion that the most important advantages may result to our country and to mankind, from a medical combination to check the ravages of this destructive pestilence, I take the liberty of addressing the gentlemen of the profession most distinguished for their knowledge and liberal sentiments. The prevention of diseases is certainly the most beneficial, and  
ought

ought to be the most honourable branch of medical science.

FROM the degree of success with which our regulations to prevent the Small-pox have been executed at Chester, tho' generally opposed by the most untoward prejudices, I have not a doubt, that the natural distemper might be in a great measure excluded from any district whose inhabitants, to avoid this dreadful pestilence, would willingly and gladly accept of inoculation. Such institutions, wherever established, would immediately preserve the lives of a large proportion of the young generation. But their beneficial consequences would be infinitely more important. By due perseverance, they would probably correct the medical errors and superstitious opinions which have so long and so fatally deluded mankind. On facts publicly ascertained, to the full conviction of the more intelligent part of society,



society, there might be safely and successfully founded a general law to promote inoculation, or, what would be incomparably more easy, and more grateful to the feelings of humanity, to establish regulations that would *exterminate the Small-pox from Great-Britain*. To attain so important a blessing would require the general, united, and persevering exertions of our legislators and magistrates, as well as the medical faculty. It would employ much time and labour, executed with assiduous zeal, care and attention. No service could deserve to be more amply rewarded, if we estimate its value by the multitude of lives it would preserve, and the infinite variety of human misery it would prevent. To accomplish a plan so beneficial to our country, and to humanity, would be highly honourable to our profession, and unspeakably grateful to every heart warmed with the generous ardour of patriotism and philanthropy.

## Errata &amp; addendum.

Page 5. ' michief' for ' mischief.' p. 10. l. 13. ' fix' for ' seven.' p. 24. l. 4. ' varlious' for ' variolous.' p. 113. l. 13. ' Hncee' for ' hence.' p. 198. l. 2. ' above-mention' for ' above-mentioned.' p. 36. after the 9th Case, add,

On June the 25th, 1784, Master ——— 13 years of age, went into a chamber, where there was a boy 13 years old recovering, and another ill of the Small-pox. He took notice to me, that he perceived a peculiar smell in the room. On the 9th of July his eruptive fever commenced; that is, on the 15th day after he was infected. This case deserves peculiar attention, as it affords a clear and decisive instance that the period between infection and the eruptive fever, was longer in the natural, than it is in the inoculated Small pox. Mr. Nicholls, surgeon, of Ruthin, was also witness of this fact.















